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LECTURES
ON
NATURAL AND DIFFICULT PARTURITION.

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LECTURES

ON

NATURAL AND DIFFICULT PARTURITION.

BY

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TO

RICHARD CARMICHAEL, Esq.,

M. R. I. A.

PRESIDENT OF THE ROYAL COLLEGE OF SURGEONS, AND OF THE MEDICAL ASSOCIATION OF IRELAND;

CONSULTING SURGEON OF THE RICHMOND SURGICAL HOSPITAL, THE WHITWORTH AND HARDWICKE MEDICAL HOSPITALS; AND CORRESPONDING MEMBER OF THE ROYAL ACADEMY OF MEDICINE, PARIS.

My dear Mr. Carmichael,

Under your guidance, I received the first principles of my medical education; and as you have sown the seed, it is only natural that you should reap the fruit.

The quality, however, depends so much more on the soil than the cultivator, that there is too much reason to apprehend, that these *first fruits* which I now present to you, may prove to be a barren production. Nevertheless, if you accept the Dedication as a testimony of the respect and esteem of a former Pupil, the work will fulfil at least one object, in giving me the opportunity of thus expressing sentiments with which I am deeply impressed, and which I have ever felt towards you.

I remain,

My dear Mr. Carmichael,

Very faithfully yours,

Edward W. Murphy.

PREFACE.

The following lectures are the substance of those that have been given on the subject of Natural and Difficult Parturition in University College. The writer has published them in this form in order that his pupils, recalling to their minds the lessons they have received, may be enabled to examine the principles and precepts delivered to them with more care and attention than could be done from the evanescent impressions of an oral lecture.

The order of the course has been slightly altered by the introduction of the two first lectures on the obstetric Anatomy of the Pelvis; these are generally given in the commencement of the session with the Anatomy of the generative organs; those on Gestation follow, and then Parturition is entered upon. The importance of a correct knowledge of the anatomy of the pelvis to render

intelligible the mechanism and the difficulties of Parturition induces the writer to deviate from that arrangement and to adopt the order at present observed.

He trusts that the reader will therefore pardon what may appear to be unnecessary repetition in the subsequent lectures where the anatomy of the pelvis is alluded to, and descriptions previously given are briefly recapitulated.

EDWARD W. MURPHY.

12, *Henrietta Street,*
Cavendish Square.

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Gentlemen,

The first subject to which I shall direct your attention, is the anatomy of the pelvis, so far as it is connected with the process of parturition. It would be unnecessary to enter minutely into its descriptive anatomy; we shall dwell only on those points that are connected with practical midwifery. In this sense, it will require your particular attention. The difficulties, sometimes almost insuperable, which occur in the process of parturition, arise most frequently from the disproportion that exists between the head of the child, and the space it has to pass through. The source of many of these difficulties is in the pelvis; and the irregularities in its shape are often the most frequent causes of difficult labour. Independently of this, the

beautiful mechanism which Nature adopts in the passage of the child through this bony cavity, requires an accurate knowledge of its anatomy, in order to understand the perfection of the contrivance.

The bones of the pelvis are three: *two coxal or hip bones, and the sacrum* with its appendage *the coccyx.* In the process of ossification, the coxal bones are not completed until a later period, consequently, the older anatomists have been in the habit of describing it, as consisting of three bones—the ilium—the ischium—the pubis; but this is evidently incorrect: we shall therefore, consider them as parts of the same bone, consisting of an iliac, ischiatic and pubic portion.

The iliac portion is much the largest, and is divided into two parts, by a very well-defined line of demarcation, which is a continuation of the linea-ileo-pectinea, and terminates at the sacro-iliac articulation. Superior to this line is the iliac fossa, being the internal surface of a broad irregular portion of the bone sometimes called the *ala* of the pelvis: it belongs to the abdominal cavity. This portion is completely surrounded by very powerful muscles. The iliac attached to its internal surface, the gluteal to its external; and to its crest are inserted the muscles of the abdominal parietes. Being, therefore, a common point of attachment to muscles of such power, it is necessarily very irregular both in its shape and thickness, the crest rough and waving, the centre of the bone thin, smooth, and sometimes even diaphanous. In the female pelvis it is more expanded than in the male, gives a greater breadth to the hips, and, being sufficiently conspicuous, it is often taken as an index of the proportion of the pelvis itself; here, however, an error may be very readily committed, inasmuch as the cavity may be narrow, and yet the alæ of the pelvis very much apart. This greater breadth is obviously very advantageous, when the increasing uterus begins to occupy the abdominal cavity. In the well-formed pelvis, the distance from one antero-superior spinous process to the opposite, is about ten inches.

The inferior portion forms a part of the true pelvic cavity, and principally consists of the ischium. Its internal surface is bounded by the obturator foramen on the one side, and the ischiatic foramen on the other: it is smooth, and corresponds to the acetabulum on the external surface. This surface is called

Vertical Section of Pelvis,
Showing the anterior and posterior surface of the plane of the Ischium.—The lines represent the inclined plane of the promontory—plane of the brim—of the cavity—of the outlet. Vide p. 12.

(in obstetric language) *the plane of the ischium*, because the head of the child glides upon it in its descent, and passes forwards under the arch of the pubis; but if carefully examined, it will be found to consist of two planes very slightly inclined in opposite directions, and divided by a line passing from the pectineal eminence to the spine of the ischium. In some pelves, this is more obvious than in others; but when the soft parts are attached, this will be found nearly corresponding to the reflections of the peritoneum which form the broad ligaments. Thus, the internal surface of the ischium before the soft parts are removed presents two broadly curved surfaces, one anterior, the other posterior; these greatly contribute to facilitate the rotation of the head of the child in passing through the pelvic cavity. *The anterior plane* terminates at the obturator foramen, an opening nearly filled with membrane, giving support to the internal and external obturator muscles, and offering less resistance to the advance of the head forwards, than if it consisted of bone. The obturator foramen is bounded by the ischio-pubic ramus, the pillar of the arch of the pubis. It presents a smooth surface, bevelled off towards the arch; and when the head passes from the obturator foramen upon it, this inclination greatly assists its exit under the arch of the pubis. *The posterior plane* terminates in the ischiatic foramen, and the portion of the head which comes upon it, glides in a similar manner upon the coccygæus and

pyramidal muscles, and shorter sacro-ischiatic ligament towards the hollow of the sacrum. Thus, the inclinations of these surfaces oblige the head to pass through the pelvic cavity in a spiral direction. The pubic portion of the bone is smooth on its internal surface, which also greatly favours its advance. The only remaining points connected with this bone worthy of your notice, are *the spine*, and *tuber of the ischium*. To the former is attached the inner short sacro-ischiatic ligament, upon which the head glides into the hollow of the sacrum: it is, therefore, important that it should present no impediment to this motion; and being short, rather rounded and smooth in the normal pelvis, it does not do so; but if much acted upon by the muscles attached to it, new osseous matter is deposited; the spine increases in length, becomes rough, and sometimes is drawn inwards, and thus will present an obstacle that at once arrests the head. From a similar cause, the tubera-ischii often oppose the escape of the head from the outlet of the pelvis, when it is enlarged by increased deposition of bone. These causes of delay are only met with, when the pelvis is surrounded by strong and constantly exercised muscles; and therefore you may expect to find them more frequently among a healthy, vigorous, rustic population, than in towns or manufacturing districts. But in the latter class, a similar impediment may arise from a cause of a perfectly opposite character, wherein the pelvis becomes diseased, its osseous matter diminished, and the spines and tubera-ischii are pressed too close together.

The next bone to which I shall direct your attention is *the sacrum;* this bone is placed between, and is very firmly united to the two other bones: it forms a kind of key-stone to the pelvic arch, upon which the spinal column rests. Its external surface is extremely rough, and gives insertion to the most powerful muscles of the back: the internal is smooth, and forms what is called, in obstetric language, *the hollow of the sacrum*. The curvature of the sacrum, which forms this hollow, is worthy of your attention: it varies very much in different pelves; if it be too straight, the antero-posterior space of the pelvic cavity is diminished; if too abruptly curved, the coccygeal extremity resists the progress of the head.

That portion of the bone, however, which has received most attention, is distinguished by the remarkable title of the *Promontory*

of the Sacrum, a term used by the older authors, and is a sufficient evidence of the frequent instances in which the difficulty of labour has been attributed to this projecting point. The passage round the promontory, which was supposed to be the leading difficulty, became a kind of doubling the Cape of Good Hope; and if it were well-formed, or that the head advanced beyond it, all was well. It is rather the intervertebral cartilage which unites the sacrum to the last lumbar vertebra, that forms the projection, than the superior surface of the sacrum; and therefore, the promontory lies a little above the sacrum, or rather the sacrum is its inferior boundary. The opposite extremity of the sacrum terminates in the coccyx, which, in the female pelvis, is generally moveable, and by its mobility contributes to increase the outlet of the pelvis, when necessary to parturition. If unfortunately ossification should take place between it and the sacrum, great difficulty is necessarily produced; but this accident is very rare in the healthy pelvis during the parturient period.

Such are the bones that constitute the pelvis. Let us now consider the manner in which they are united together, and you will perceive every provision to secure strength, and at the same time to avoid the effects of concussion. In this respect, the union of the coxal bones to each other affords a very perfect example. *The symphysis pubis* consists of a mass of highly elastic fibro-cartilage, arranged in a series of concentric laminæ, the outer layers firm and resisting, while those within are softer; and in the centre of them is placed a small arthrodial articulating surface, moistened with a portion of synovial fluid. The shocks to which the pelvis is liable in the more violent motions of the body, as in leaping, especially downwards, are all more or less concentrated upon the symphysis pubis, and hence a provision of this kind is necessary. In the female pelvis, by its greater breadth, the space between the pubic portions of the coxal bones is increased, and at the same time, a perfectly smooth surface is presented posteriorly to the head. If unfortunately, the reverse should take place, if the symphysis were narrow, and still more, if it were made rough from ossific depositions, serious injury might be done to the soft parts lying between it and the head, and as the urethra lies in this position, you can readily perceive the risk that might occur; hence it is necessary that the symphysis pubis should be broader and smoother in the female, than in the male pelvis.

The sacro-iliac articulation is remarkable in its contrivance to preserve immobility. If you examine carefully the articulating surfaces of the sacrum and ilium, you will find them so adapted to each other, or, if I might use the expression, so dove-tailed on one another, as when pressed together not to admit of the least motion: such is the case even in the dried bones; but when in the recent state we find a firm cartilage intervening, the articulation surrounded by the strongest ligaments, and additional strength given by the tendinous expansion of the neighbouring muscles, we at once perceive, by the provision that is made to prevent it, the importance of preserving the union of the sacrum and coxal bones undisturbed. When we recollect the relative position of the sacrum, the key-stone of the arch we have described, the centre upon which the spinal column rests, the wedge which keeps the coxal bones apart, and of course the point of resistance to any force tending to compress these bones, as the lower extremities necessarily would, if not in this way prevented, we can understand why a compact and firm articulation is so essential.

The inferior extremity of the sacrum is united to the coccyx by a fibro-cartilaginous lamina similar to the intervertebral cartilages, and is supported by anterior and posterior ligaments. This articulation, as well as those connecting the small bones of the coccyx together, admits a certain extent of motion of one bone upon the other, so that the coccyx from being curved may be rendered nearly straight, a highly essential advantage in the female pelvis.

The superior surface of the sacrum is united to the last lumbar vertebræ, by an intervertebral fibro-cartilage, which differs from the others in being much deeper before than behind; the aspect of the two articulating surfaces are consequently oblique to each other, and the cartilage presents a broad surface anteriorly which, strictly speaking, forms what is called the promontory of the sacrum. It is the most prominent point of the spinal column anteriorly, the whole weight of which rests upon it; and this part would necessarily be pressed forward, if the pelvis were weakened by disease.

Having thus given you a detailed description of the several bones composing the pelvis and the manner in which they are united together, let us proceed to consider the pelvis collectively. You perceive that it is divided into two portions by the line already alluded to, a continuation of the linea-ileo-pectinea on either side, passing along the lower margin of the iliac fossa, and

terminating at the sacrum: this is the brim of the pelvis, which in the older language of midwifery was called by the English term, "basin" and "brim of the basin;" a term which included not merely the line described, but the parts of the ilia above it. These divisions have been called by different names,—"the greater and lesser pelvis," "the true and false pelvis." Sometimes the whole portion above the line is still called "the brim"—and that below it "the cavity" of the pelvis.

It is more important, however, to recollect that the superior portion belongs to and forms part of the inferior boundary of the abdomen, and must be taken in connection with it: the axis of this part of the pelvis is therefore the same as that of the abdomen. The pelvis, and consequently the abdomen, are wider here in the female than in the male, in order to accommodate the uterus, when it becomes an abdominal viscus. It may, however, be too wide or too narrow: if the ilia be too open, they give no support to the uterus when it enters the abdomen; the natural obliquity of the uterus is therefore greatly increased—it falls too much to one side, and so may remain until labour begins—then the action of the uterus becomes irregular and inefficient, and labour is delayed from this cause alone;—if they are very upright, the uterus rises into the abdomen too much in the middle line of the body; and if the brim be too wide, the weight of the uterus presses down on the soft parts beneath it—it may descend even into the vagina and give rise to the disease called prolapsus uteri: if too narrow, the uterus has not room to pass between the pubis and the promontory of the sacrum, irritation takes place, premature action of the muscular fibres is induced, and miscarriage is the result: thus you see that even here exactness of proportion is important.

But this is still more remarkably the case, when we consider the "pelvic cavity," or "true pelvis," through which the head of the child has to pass: it will therefore require an attentive examination.

This cavity, which is destined to contain the genito-urinary organs, is bounded above by the brim of the pelvis, below by the tubera-ischii and coccyx. The smooth posterior surfaces of the bodies of the pubis with their connecting symphysis, the obturator spaces, and the ischio-pubic rami, form its anterior wall; the sacrum and ischiatic notch, the posterior boundary; and the planes of the ischium, already described, constitute its sides. A very imperfect idea of the cavity is formed if it be confined to the

dried pelvis: it is necessary to consider the empty spaces left in the bones as being filled up with the soft parts which belong to them in order to obtain an accurate notion of it. *In the recent pelvis*, therefore, we find, in the anterior wall, the obturator spaces occupied by fibrous membrane to which the obturator muscle is attached, having a small opening above for the transmission of the obturator nerves and vessels. This muscle is concealed by the levator ani, and both are enclosed in fibrous membrane, so that in this space a kind of muscular cushion is formed for the head, as it advances into the cavity of the pelvis. Immediately below the symphysis lies the subpubic ligament, and beneath it a continuation of the same fibrous membrane, giving passage to the urethra.

In the posterior wall, the ischiatic notch is converted into a foramen by the internal sacro-ischiatic ligament which unites the sacrum to the spine of the ischium ; and beneath it a second opening is formed by the greater sacro-ischiatic ligament which passes from the sacrum to the tubers of the ischium. The larger sacro-ischiatic foramen is occupied by pyriform muscle, the thick branches of the sacral plexus of nerves which converge to form the great sciatic nerve, and the gluteal and ischiatic vessels. The smaller foramen is filled by the tendon of the obturator muscle, and the pubic vessels ; but, lying in a plane posterior to the former, it is rather withdrawn from the cavity of the pelvis. The sides of the posterior wall of the pelvic cavity present also to the advancing head of the child, a muscular cushion similar to the anterior. The planes of the ischia form the sides of the cavity, and, if you recollect the aspect which they present, their double inclination anteriorly and posteriorly, you will perceive the effect which this must have on a body passing along their surface,—that it cannot preserve the same direction, but must necessarily be rotated slightly as it advances. If, for instance, we assume that the head is so placed that it enters the pelvic cavity nearly transversely with the occiput, corresponding to the plane of the left ischium, and the sinciput to that of the right, if the occiput descend on the anterior plane, it is directed forwards toward the obturator space, while the sinciput, gliding along the posterior plane of the opposite side, is directed backward to the ischiatic space; thus slightly altering from the transverse to the antero-posterior direction. As the head descends still lower in the cavity of the pelvis, it meets anteriorly the ischio-pubic ramus, and posteriorly the inner

short sacro-ischiatic ligament; the former is so bevelled off, that the occiput glides from it under the arch of the pelvis, the latter forms a smooth inclined plane upon which the sinciput passes into the hollow of the sacrum. When this is accomplished, the head will lie in the antero-posterior direction; so that if it enters in the direction which has been supposed, it cannot pass through the pelvic cavity without performing a rotation. Let us now consider whether, when the head enters the pelvic cavity, it is placed in the manner which has been assumed: this leads us to examine what is called the brim of the pelvis—the shape of the brim in the dried female pelvis is rather elliptic, the long axis being its transverse measurement; consequently, the brim affords more room to the head when it enters it, in the transverse, than in any other direction. But this applies only to the denuded bone: if we examine the brim in the recent state, we find it not elliptic but triangular; the psoæ muscles form the sides; the promontory of the sacrum, the apex; the base being the anterior portion of the pelvis, lying between the pectineal eminences on either side; hence the greatest space of the brim would not be in the transverse but in the oblique direction: the head therefore enters the pelvis in the oblique measurement of the brim, and when the occiput lies anteriorly (its usual position) it at once meets the anterior plane of the ischium, and is rotated in the manner stated.* The outlet of the pelvis also requires some attention; but there is so much more of the soft parts than of bone entering into its formation, that here also the dried pelvis gives but an imperfect conception of it. As we should wish, however, to reserve a more particular description of the perinæum, it will be sufficient at present to assume that it is a firm resisting structure, partly closing up the lozenge-shaped space which the outlet forms. The sides of the quadrangle are constituted by the greater sacro-ischiatic ligaments and the ischio-pubic rami, the angles are antero-posteriorly at the pubis and coccyx, and laterally at the tubera ischii; the perinæum closes up the posterior half; the vulva lies in the anterior: the sides are not in the same plane; those formed by the ligaments run downwards and forwards, while the

* In the description here given of the progress of the head through the pelvis, it is assumed that the pubic angle is 90°, sufficient to allow the occiput to escape completely under it; but many pelves, in other respects well formed, have the pubic angle less than this: the occiput therefore descends along the ischio-pubic ramus still further, and the head is expelled in the oblique direction. The latter is the more frequent course.

ischia-pubic rami run downwards and backwards, both meeting at the tubera ischii, as if the lozenge were bent in the middle. If we suppose the head advancing still onward, and endeavouring to escape from the outlet, we find that a change in its motion takes place—the occiput passes down along the anterior sides until it has sufficient space to emerge under the pubic arch, it then becomes a fixed point, a centre of motion, round which the head rotates, from behind forwards, passing along the curve of the sacrum, straightening the coccyx and pressing upon, distending, and forcing open the soft parts which form the perinæum, with a force which can only be understood by recollecting the kind of power employed. If you please to class it with the mechanic powers, you may consider it a lever of the third order. This force of distension is so great, that the perinæum would seldom be preserved from laceration if nature did not adopt other provisions to prevent such an accident. Even in the best-formed pelvis, the outlet is narrow, and affords but little space for the head to pass; you can therefore readily perceive the difficulties which must arise, if there be any diminution of its transverse measurement.

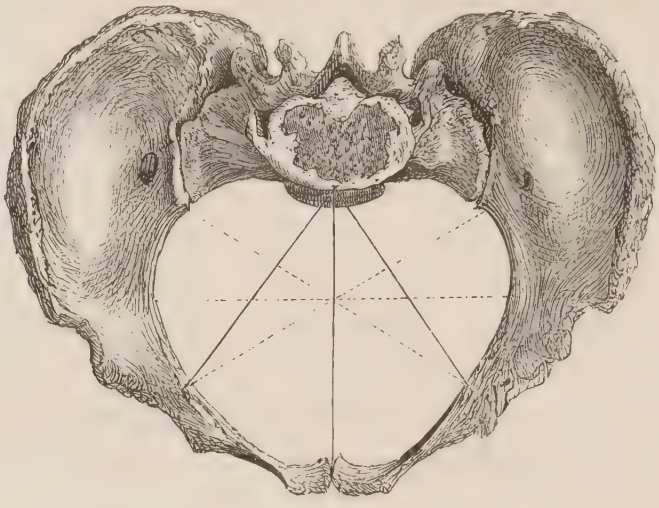
The passage of the head through the pelvis shews mechanical contrivance in the construction of the latter. The more it is examined, the more perfect this mechanism will be found: its necessity will be obvious, if you reflect on the very close adaptation of the head to the pelvis. The human head is larger in proportion to the size of the offspring than that of any other animal, and in consequence of man's erect position, the cavity and outlet of the pelvis is more closed in, for the purpose of supporting the weight of the viscera above it. The head being large and the pelvis narrow, every contrivance that nature can adopt, is essential to accomplish her purpose; and also the proportions between both must be so exact, that the slightest deviation becomes an obstacle. Hence obstetricians, even from an early period, knowing the importance of accuracy in these proportions, have endeavoured to reduce them to a standard of measurement. They have sought to ascertain the dimensions of the perfectly formed pelvis; and having fixed upon that as the normal standard, it was supposed that every deviation from it would explain one or other of the difficulties which may be met with. How far this is possible, we shall have again to consider; at present let us observe the manner in which it has been measured. Every impediment to the passage of the head seems to

have been referred to two sources—either irregularity of the brim, or narrowing of the outlet. In nearly all the popular works on Midwifery, these are the only parts that are measured;* and, consequently, all difficulties are attributed to their irregularities. As the brim seems to be most commonly at fault, it has received a proportionate share of attention. It has been measured over and over again in the dried pelvis; very ingenious instruments have been contrived for the purpose of measuring it in the recent state, and during life; and every attempt has been made to determine by such means, beforehand, when it is possible for the head to pass, and when it cannot.

Measuring the pelvis in this way, and with this intention, may serve our purpose in detecting pelvic deformities where the disproportion is great; but it is very questionable whether it will enable us to discriminate those slighter degrees of disproportion which are so often the causes of delay and difficulty in parturition. It is not, therefore, with this object in view, that we would direct your attention to these measurements, but rather for the purpose of still further illustrating the mechanism already alluded to, as well as to point out to you that irregularities in the brim and outlet are not the only difficulties met with in the pelvis. Let us first consider the axes of the pelvis. If the brim of the pelvis be supposed to be a plane surface, and that a straight line passes perpendicularly through its centre and is continued on both sides, this line would touch the hollow of the sacrum near the coccyx in one direction, and would pass out below the umbilicus in the other. This is called the axis of the brim. This line intersects and forms an angle with the perpendicular of the body more or less acute; the angle is generally 45^0, but it may be much greater; sometimes it is less. The outlet has a different axis, and would be represented by a line passing downwards and forwards from a point below the promontory of the sacrum nearly in the direction of the vagina, but as this is curved, it would be more correct to describe it as touching the floor of the vagina, and passing out through the centre of the perinæum. These lines intersect each other; and in order that the head should pass from one axis into the other, it must describe a curve from above downwards, which takes place when the occiput rests upon the arch of the pubis.

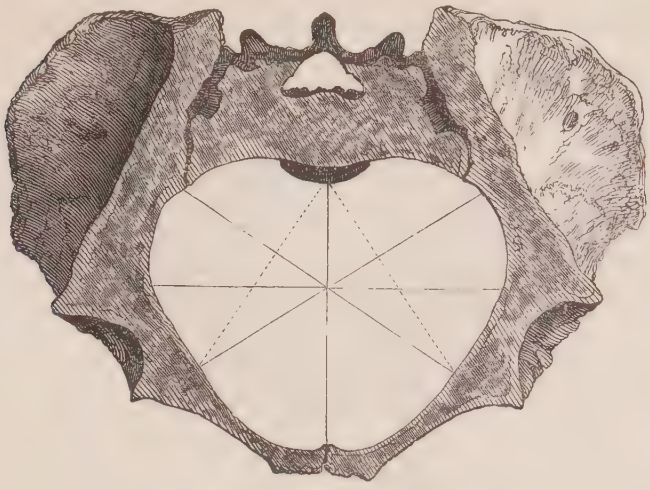
*Dr. Churchill's valuable little work is, however, an exception.

In place of confining your attention to the measurements of the brim and outlet of the pelvis, we would wish you to consider the pelvis in another point of view, as consisting of a series of planes taken from above downwards, having different aspects and different measurements. The first of these is above the brim posteriorly,



Horizontal section of pelvis made at the brim of the pelvis.—*The superior surface* shewing the antero-posterior and lateral measurements of *inclined plane of the promontory*—The dotted lines represent the transverse and oblique measurements of the brim.

but meets it anteriorly at the symphysis pubis: it is therefore an inclined plane, forming an acute angle with the plane of the brim. The antero-posterior measurement of this plane is taken from the centre of the lumbo-sacral intervertebral cartilage to the top of the symphysis pubis; it is generally 4 inches, and is of importance, because it gives the projection of the promontory of the sacrum much more accurately than the same measurement of the brim: in fact, the true promontory is above the brim. The lateral measurements are taken from the same point to the pectineal eminences on either side; these are about $3\frac{1}{2}$ inches, but are very seldom found exactly equal. It is necessary to recollect these distances, because of the effect sometimes produced by their inequality. For instance, if the promontory be very much directed towards the right pectineal eminence, the head would be at once prevented entering the brim if it preserved its usual position, that is, with its anterior part opposite the right sacro-iliac synchondrosis: but if it took the other direction, so that the same part was applied in the same way to the left side, it would pass quite easily. Hence, in the same patient, one labour may be difficult and another easy, merely from the accidental position of the head. The second



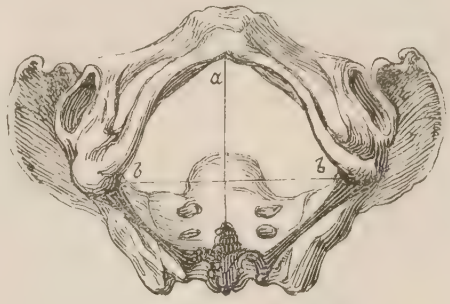
Inferior surface of same section, showing the antero-posterior, transverse and oblique measurements *of the brim of the pelvis.*—The dotted lines represent the lateral measurements of the inclined plane.

is the plane of the brim, of which the antero-posterior measurement, from the centre of the upper edge of the sacrum to the top of the symphysis pubis, is about four inches. The transverse, from the centre of one ilium to the other, is $5\frac{1}{8}$ inches, and the two oblique measurements, passing from each pectineal eminence to the sacro-iliac articulation of the opposite side, about 5 inches.

Remaining section of pelvis, shewing the antero-posterior, transverse and oblique measurements *of cavity.*

We have, then, the plane of the cavity, one most generally omitted, and perhaps the most important of the three. The antero-posterior measurement of this plane passes immediately below the symphysis pubis parallel to that of the brim, directly backwards to a point above the middle of the sacrum, it is about $4\frac{1}{4}$ inches; the transverse passes from the centre of one plane of the ischium to the other, and is $4\frac{1}{2}$ inches, and the oblique lies between the centres of those muscular masses which fill up the

obturator and ischiatic spaces. Their measurement is uncertain, but is more than 5 inches.



Outlet of pelvis.

The outlet cannot be considered as a plane. Its antero-posterior measurement is taken from below the symphysis pubis to the extremity of the coccyx, and when the coccyx is extended is about $4\frac{1}{2}$ inches. The transverse measurement between the tubers of the ischia lies above this, and is about the same; so that when the head is pressing through the outlet, it forms a pretty accurate circle round it.

If you study attentively these proportions, you will at once perceive how much they contribute to the rotation which has been explained to you. Comparing the plane of the brim with the plane of the cavity, you find the transverse measurement of the cavity diminished, while the antero-posterior and oblique distances are increased; you may also observe, that the oblique lines of the cavity approach nearer to the antero-posterior direction than those of the brim of the pelvis, so that when the head passes from the brim into the cavity, always seeking the widest space, it first rotates from the oblique of the brim into the oblique of the cavity, and as it descends, is obliged, from the convergence of the planes of the ischium, still more to assume the antero-posterior direction, until, the occiput escaping under the pubic arch, it becomes fixed in this position: then the second rotation of the head from behind forwards commences, the transverse measurements of the head corresponding to the transverse of the outlet, and the longitudinal passing successively out in the antero-posterior measurement of the outlet.* In stating to you these measurements, as being those of the standard pelvis, I am very far from wishing to convey to you that they are constant or immutable: on the contrary, you will find, when you examine

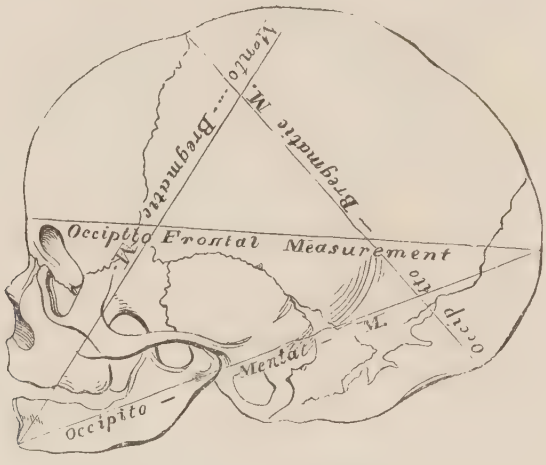
* It is here assumed that the pubic angle is sufficiently wide to allow the occiput to pass completely under the arch, and to place the head in the antero-posterior direction.

these points for your own satisfaction, that the pelvis is no exception to natural objects in general, and that it agrees with them perfectly in this principle, that two of the same kind are never exactly alike; when you study it, and are accustomed to observe it, you will find as much difference in the pelves as you would in the faces of those to whom they belonged; and therefore, where no two pelves exactly agree, it would be impossible to fix a standard: consequently, the measurements given must only be considered as a kind of mean, to which there are numerous exceptions. In order to demonstrate this in a clearer light, you have before you a table of measurements of several pelves, all well formed, and through which the head of the child would readily pass, but no two of them agree; you have also before you the measurements of the pelvis given by different popular authors* The transverse space of the outlet is sometimes measured in a different manner, in order that the whole space within the ischio-pubic rami may be included, that is by making the symphysis pubis the centre of a circle, of which these pillars (as they are sometimes called) are the radii, the arc of the circle between these is measured in degrees, which of course, gives the angle at the pubis. The pubic angle in the standard pelvis is 90°. Other measurements are given, which are not of equal importance. The depth of the cavity, anteriorly, posteriorly, and laterally, is stated thus by Dr. Burns:—depth of symphysis, $1\frac{1}{2}$ inches; depth of sacrum, 5 to 6 inches; depth of ischium, $3\frac{3}{4}$ inches.

In the description given of the pelvis, it has been explained to you, that, from its construction, the head must rotate first laterally, and then in the antero-posterior direction before it is expelled: but these are not the only motions of the head in its passage through that cavity, there are others which still further illustrate mechanical contrivance, and which deserve your attention. Before alluding to these, however, we would wish you to understand, that when we speak of the *head* passing through the pelvis, and that in a certain direction, we do not mean you to suppose that this is *constantly* the case: on the contrary, the head may enter the pelvis in a different position; and that of the child itself is sometimes reversed so that the breech or foot passes first. It is only for the purpose of illustration, that we would assume the head as the presenting part, as it is called obstetrically, and its

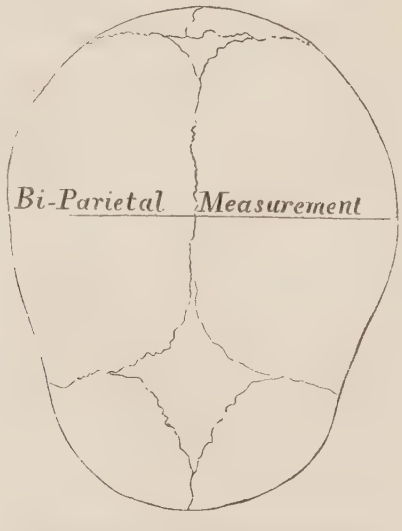
* Vide Tables, No. 1 and 2, placed at the end of the Lecture.

position as uniform; the variety of these positions, and the mode of ascertaining them, will again come under our consideration in future lectures.



Longitudinal Measurement of the Child's Head.

Like the pelvis, so the child's head has been measured in different directions. There are three measurements given of its longitudinal axis. One from the occiput, just above the neck to the middle of the open membraneous space between the frontal and parietal bones, called the "bregma" or "anterior fontanelle," this is generally about $3\frac{1}{2}$ inches. Another passes horizontally from the most projecting point of the occiput to the centre of the frontal bone, above and between the superciliary ridges. This is usually $4\frac{1}{2}$ inches. The third lies between the same point of the occiput and the centre of the chin. This is 5 inches.



Transverse Measurement.

There are also three transverse measurements. One between the parietal protuberances, which is $3\frac{1}{2}$ inches; another between the temporal fossæ, which is from $2\frac{1}{2}$ to 3 inches; a third between

the zygomatic arches, which is from $3\frac{1}{2}$ to 4 inches. Sometimes three distances are given from the chin, as a central point; one gives the length of the face and forehead (mento-frontal) $3\frac{1}{2}$ inches; a second, from the chin to the bregma, is 4 inches; a third, from the chin to the occiput, is rather more than 5 inches. We have arranged them thus in a tabular form.

LONGITUDINAL.	IN.	MEASUREMENTS.	IN.	TRANSVERSE MEASUREMENTS.	IN.
Occipito-Bregmatic .	$3\frac{1}{2}$	Mento-Bregmatic . .	4	Bi-parietal	$3\frac{1}{2}$
Occipito-Frontal. . .	$4\frac{1}{2}$	Mento-Frontal . . .	$3\frac{1}{2}$	Bi-temporal	3
Occipito-Mental . .	$5\frac{1}{8}$	Mento-Occipital . .	$5\frac{1}{8}$	Bi-zygomatic	$3\frac{1}{2}$-4

The shortest of these measurements in the longitudinal axis is the occipito-bregmatic; and when the head enters the pelvis, which it does obliquely, this is made to correspond to the oblique measurements of the brim, by the anterior part of the head being so pressed up that the chin rests upon the chest of the child: but as the head descends into the cavity, and gains more space in the oblique and antero-posterior direction, the forehead advances more than the occiput, so that the occipito-frontal measurement corresponds nearly to the oblique of the cavity. A little lower down, at the short sacro-ischiatic ligament, the forehead becomes a resting-point, and the occiput again descends obliquely along the ischia-pubic ramus until it emerges, with part of the parietal bone, under the pubic arch. The head therefore, in its descent, seems, as it were, to oscillate upon its transverse axis.

The bi-parietal measurement of the head is generally stated to correspond to the conjugate or antero-posterior axis of the brim; and as the former is $3\frac{1}{2}$ inches, the latter 4, only half an inch is allowed for the soft parts, even in the best-formed pelvis; consequently, the least diminution of the conjugate axis causes a difficulty, a greater one becomes an obstruction. Hence, among accoucheurs, it has been an anxious problem to determine the smallest conjugate diameter (as it is improperly called) through which the head can pass without destroying the child.

Its solution has been attempted by comparing the bi-parietal measurement of the head with the conjugate of the pelvis, and it has been stated by Dr. Joseph Clarke (a high practical authority), that if the conjugate be less than $3\frac{1}{2}$ inches, a living child cannot pass the brim of the pelvis. But in all these discussions, it has

been too confidently assumed that these two measurements of the head and the pelvis exactly coincide. They do not do so: on the contrary, as the head is entering the pelvic cavity, the parietal protuberance next the pubis descends lower than that next the sacrum, so that the bi-parietal axis lies obliquely downwards, and so it remains more or less until the occiput escapes under the pubis. The part of the head, therefore, which would be felt lowest in the pelvic cavity is this parietal bone. By this means nature avoids the difficulty which would often arise, if both parietal protuberances descended in the same plane.

Thus you perceive that the head slightly rotates on its longitudinal axis also; and, in order to effect its passage through the pelvis, combines four distinct movements: two of them upon the vertebral column, one in the lateral, and one in the antero-posterior direction; two on the head itself, one on its longitudinal, and a second on its transverse axis. By the combination of these motions the passage of the head is ultimately effected.

TABLE OF MEASUREMENTS IN EIGHTEEN PELVES NOT DISEASED, SHEWING THE VARIETY IN THEIR PROPORTIONS.

No. in Museum	No.	Inclined Plane of Promontory.*			Plane of Brim.				Cavity.†		Outlet.		Arch of Pubis.	Character of Pelvis.
		Prom. to Pubis.	Prom. to L.P.E.	Prom. to R.P.E.	Ant. Post.	Transverse.	Left Oblique.	Right Oblique.	Ant. Prop.	Transverse.	Ant. Post.	Transverse.		
7	1	4	$3\frac{1}{2}$	$3\frac{3}{4}$	$4\frac{1}{8}$	$5\frac{1}{2}$	$4\frac{7}{8}$	$4\frac{7}{8}$	$4\frac{5}{8}$	$4\frac{7}{8}$	$4\frac{3}{8}$	$4\frac{5}{8}$	70°	Normal (nearly).
14	2	4	$3\frac{1}{4}$	$3\frac{1}{4}$	4	5	$4\frac{6}{8}$	$4\frac{7}{8}$	5	$4\frac{1}{2}$	$3\frac{6}{8}$	4	75	,,
8	3	$3\frac{7}{8}$	$3\frac{1}{2}$	$3\frac{1}{4}$	4	$5\frac{1}{8}$	$4\frac{3}{4}$	$4\frac{3}{4}$	$4\frac{6}{8}$	$4\frac{1}{4}$	$4\frac{1}{8}$	$3\frac{7}{8}$	60	Nearly normal (small).
15	4	$3\frac{6}{8}$	$3\frac{1}{2}$	$3\frac{3}{8}$	4	$5\frac{1}{2}$	$4\frac{7}{8}$	5	$4\frac{1}{2}$	$4\frac{3}{4}$	$4\frac{1}{2}$	$3\frac{3}{4}$	70	,, ,,
10	5	$3\frac{7}{8}$	$3\frac{3}{8}$	$3\frac{1}{8}$	4	$5\frac{1}{2}$	$4\frac{7}{8}$	$5\frac{1}{4}$	$4\frac{1}{2}$	$5\frac{1}{8}$	$4\frac{1}{2}$	$4\frac{6}{8}$	90	Normal.
33	6	$4\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{1}{2}$	4	$4\frac{5}{8}$	$4\frac{6}{8}$	$4\frac{6}{8}$	$4\frac{7}{8}$	$4\frac{1}{2}$	4	$4\frac{3}{8}$	75	,,
9	7	$3\frac{3}{4}$	$3\frac{3}{8}$	$3\frac{1}{2}$	$3\frac{7}{8}$	$3\frac{3}{8}$	$4\frac{7}{8}$	5	$4\frac{3}{8}$	$4\frac{3}{4}$	$4\frac{5}{8}$	$4\frac{5}{8}$	70	Rather small.
16	8	$3\frac{7}{8}$	$3\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{7}{8}$	$5\frac{1}{4}$	$4\frac{7}{8}$	$5\frac{1}{8}$	$5\frac{1}{8}$	5	4	$4\frac{3}{8}$	80	Irregular.
18	9	$4\frac{1}{4}$	$3\frac{7}{8}$	4	$4\frac{5}{8}$	$5\frac{3}{8}$	$5\frac{1}{8}$	5	5	5	$3\frac{6}{8}$	$4\frac{6}{8}$	100	Very large.
22	10	$4\frac{1}{2}$	$3\frac{7}{8}$	$3\frac{6}{8}$	$4\frac{6}{8}$	$5\frac{1}{2}$	5	$5\frac{1}{8}$	$5\frac{5}{8}$	5	$4\frac{1}{2}$	$4\frac{1}{4}$	80	Large.
21	11	$5\frac{1}{8}$	$3\frac{7}{8}$	$3\frac{6}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{8}$	$5\frac{1}{2}$	$5\frac{1}{2}$	$4\frac{6}{8}$	$4\frac{6}{8}$	$3\frac{7}{8}$	60	Very long conjugate measurement, narrow outlet.
19	12	$4\frac{7}{8}$	$3\frac{7}{8}$	$3\frac{6}{8}$	$4\frac{7}{8}$	$5\frac{1}{2}$	5	$5\frac{1}{8}$	$5\frac{1}{8}$	$5\frac{1}{4}$	$3\frac{7}{8}$	$4\frac{7}{8}$	95	Large, and like young Pelvis.
17	13	$4\frac{7}{8}$	$4\frac{7}{8}$	$5\frac{1}{8}$	$4\frac{7}{8}$	$5\frac{1}{4}$	$4\frac{7}{8}$	$5\frac{1}{8}$	$5\frac{1}{8}$	5	4	$4\frac{3}{8}$	90	Large and normal.
6	14	$5\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{1}{4}$	5	$5\frac{1}{2}$	5	5	5	$4\frac{7}{8}$	$3\frac{3}{8}$	5	90	Large and round.
20	15	$4\frac{3}{8}$	$3\frac{7}{8}$	$3\frac{6}{8}$	5	$5\frac{5}{8}$	$5\frac{1}{8}$	$5\frac{1}{8}$	$5\frac{7}{8}$	$4\frac{7}{8}$	$4\frac{7}{8}$	$3\frac{1}{4}$	45	Very large, but outlet contracted.
12	16	$4\frac{1}{2}$	$3\frac{7}{8}$	$3\frac{6}{8}$	$4\frac{5}{8}$	$4\frac{6}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	5	$4\frac{1}{2}$	$4\frac{1}{8}$	4	75	Large, but like male Pelvis.
11	17	$3\frac{6}{8}$	$3\frac{3}{8}$	$3\frac{1}{8}$	$3\frac{6}{8}$	$4\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{5}{8}$	$4\frac{1}{8}$	$3\frac{5}{8}$	$3\frac{7}{8}$	3	45	Like male P. bone very light as if diseased.
13	18	$3\frac{1}{2}$	3	$2\frac{7}{8}$	$3\frac{6}{8}$	$5\frac{1}{8}$	5	5	$4\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{1}{4}$	$3\frac{3}{8}$	65	Like male Pelvis.

* L. P. E. Left pectineal eminences. R. P. E. Right pectineal eminences.

† The oblique measurements of the cavity cannot be given in the dried bone.

MEASUREMENTS OF THE PELVIS STATED BY VARIOUS AUTHORS.

	Burns.	Monro.	Ramsbotham.	Rigby.	Lee.	Baudeloque.	Cloquet.	Moreau & Velpeau.	Boivin.
Brim.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Antero-posterior	4	$4\frac{1}{2}$	4	4·3'	4	4	4	4	$4,4\frac{1}{3}$
Transverse	$5\frac{1}{4}$, $5\frac{1}{2}$, 6	$5\frac{1}{8}$	$5\frac{1}{4}$	5·4'	5	5	5·2 lines	5	5
Oblique	$5\frac{1}{8}$, $5\frac{1}{2}$	5	5	4·8'		$4\frac{1}{2}$	4·6 l.	$4\frac{1}{2}$	$4\frac{1}{3}$
Outlet.									
Antero-posterior	4, 5	$5\frac{1}{8}$			5		4,4·10 l		
Transverse	4	$4\frac{2}{8}$, $5\frac{2}{8}$			4		4		
Oblique	4						4		
Depth of Cavity.									
Depth of Symphysis	$1\frac{1}{2}$				$1\frac{1}{2}$		1·6 l.		
,, of Sacrum	5, 6				6		4·7 l.		
,, of Plane of Ischium	$3\frac{3}{4}$				3		3·6 l.		
Arch of Pubis.									
Base	4								
Sides	$3\frac{1}{4}$								
Perpendicular	2								
False Pelvis.									
Between Spines of Ischia	10						9·6 l.		
Ditto Centres of Crista							10·6 l.		
Centres of Crista to Brim	$3\frac{1}{2}$						3·4 l.		
Ditto Ditto to Tubera Ischii							7		

LECTURE II.

MODES OF MEASURING THE PELVIS.

Varieties in the Pelvis. *Deviations* from the Standard Pelvis—Pelvis too large—too small—imperfectly developed—like the Male Pelvis—irregularly formed. *Deformities* of the Pelvis—the Ovate Pelvis of Infancy—the Cordiform Pelvis of the Adult—Manner in which these Deformities are produced—Influence of Gravity, of Muscular Forces—Rickets and Mollities Ossium considered as Causes of Distortion. *Modes of measuring* the Pelvis—Baudeloque's Callipers—Contouly's Pelvimeter—Boivin's Pelvimeter—Digital Measurement.

HAVING, in the preceding lecture, explained to you the structure of the pelvis, its obstetric characters, its normal proportions and the manner in which the head of the child passes through it, let me now direct your attention to those numerous exceptions to the standard pelvis which are so often met with, and which become causes of delay or difficulty in parturition. Some of these are only *deviations* from the just proportions of the pelvis; others are *deformities* the consequence of disease. We shall therefore consider each class separately. 1st. The *deviations* or irregularities in the pelvis are various. It may be altogether too large, or too small; it sometimes retains its infantile shape although increased to its full size; it may resemble the male pelvis; and, again, some one or perhaps all, of its proportions may be irregular: all these *deviations* may be met with in the healthy pelvis, and therefore should be considered separately from the next class. 2nd. *The deformities or distortions* of the pelvis which are produced by disease.

The first exception, then, to the normal pelvis is that which is *altogether too large:* here is an example of it, (No 9 and 17 in the table). Such a pelvis as this could never be a cause of delay in parturition; but it may cause danger notwithstanding. For instance, when the uterus is increased in its weight and size during pregnancy, and it occupies the abdomen, the pelvis is its great support below; but if the latter be too large, the uterus presses into the vagina, gradually

inverting it; there are instances in which it has passed quite through the vagina and appeared at the vulva before labour commenced. But although this may not happen; yet when the vagina is at all distended and inverted in this manner, the foundation is laid for that troublesome disease, prolapsus uteri. Hence, the accoucheur, in such cases, uses every precaution after delivery to prevent the uterus pressing upon the vagina, until this organ returns to its original size. Another danger of a very large pelvis is, that the child may be too suddenly expelled. In most cases of parturition, the action of the uterus is continued a certain time before delivery takes place; and without entering into any enquiry as to the cause of that action, we know by experience that when once set up, it does not suddenly cease, even when the immediate exciting cause is removed. If you watch the uterus after labour when the placenta is detached, you will find contractions and relaxations still going on, although slight in their degree; these contractions sometimes increase so as to become "after-pains" (as they are called). Now, when the child, meeting no resistance from the pelvis, is suddenly expelled, the uterus may still continue to relax and contract, although the stimulus of the child be withdrawn: hence there is a danger of hæmorrhage taking place; and if the uterus (as is very probable) be thrown into irregular contractions, a stricture may be formed at the cervix uteri. The blood may only flow into the uterine cavity, being retained by a clot formed above the stricture; and thus a case of internal hæmorrhage may arise; which, if you are not prepared for, will escape your observation. Again you must recollect, that during pregnancy the abdominal vessels are more pressed upon than usual, by the addition of the uterus in the abdominal cavity; that it is the inelastic coats of the veins that yield to this pressure; and that the column of blood in the cava and large iliac veins is of necessity diminished; nevertheless the same quantity of blood ascends through other channels to the heart. What then must be the effect when that pressure is suddenly removed? You may have a most dangerous syncope, the circulation being suspended in consequence of the right side of the heart being nearly emptied of its venous blood. Another accident, which is sometimes the result of this kind of pelvis, is inversion of the uterus: the fundus of the uterus, meeting no opposition from the pelvis, sinks within itself as the child is being expelled; it is sometimes turned completely inside out, but more commonly the depressed fundus forms a kind

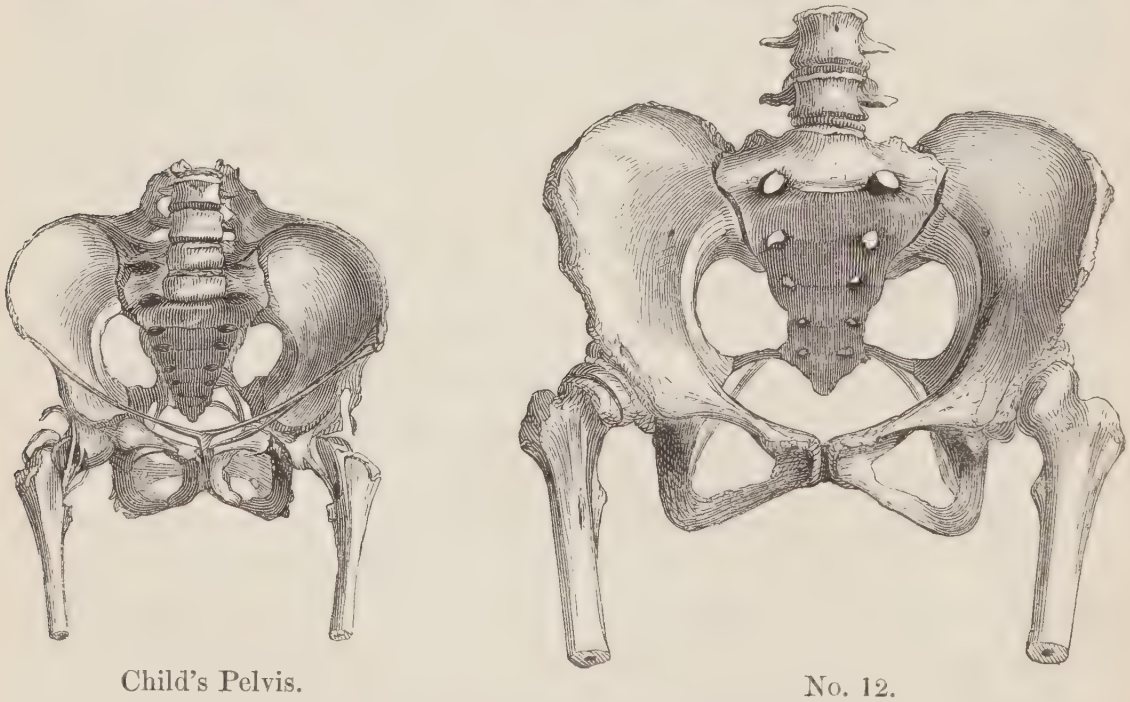
of cup-shaped cavity at the top of the uterus; this irregularity immediately excites the fibres of the uterus into an action somewhat resembling intus-susception of the intestines; the inversion of the fundus is increased; and it is ultimately forced in this state through the vagina. You perceive, therefore, that a very large pelvis is not quite so advantageous as it may appear to be.

The pelvis may be too small in proportion to the size of the head of the child. You can perfectly understand that a female who is well-formed may have all the bones small, she is consequently low in stature, but not disproportioned; and, although the pelvis bears the same relation to the rest of the skeleton that the standard pelvis does, still all the measurements of the former are less than the latter. The pelvis is diminished, but diminished equally in every part. In such a case a child of the average size would pass with great difficulty. Instances of this kind are rare, although sometimes met with; but it would be quite incorrect to assume that the pelvis must be small in females of low stature, it is much more frequently the reverse, the bones of the extremities, though diminished in length, are large, and so is the pelvis; but in the instance referred to, the bones are not only short but proportionately small, and the pelvis is of corresponding dimensions; hence you will find in this, as in other instances that an accurate observation of the bones of the extremities will assist you in forming an opinion of the pelvis. Again there are instances where the same kind of small pelvis is met with in women of the average height. Dr Rigby quotes three such cases, from Busch's Berlin Reports, in all of which labour terminated fatally.*

The development of the pelvis may be arrested: pregnancy may take place before it is perfectly completed, as in young girls. In order that the effects resulting from this circumstance be made intelligible to you, it is necessary to direct your attention to the growing pelvis. If you examine the pelvis at the time of birth, you at once perceive that it is imperfect, its ossification is incomplete, the viscera that properly belong to it are in the abdomen. because there is no pelvic cavity. During childhood its development is only slowly advancing, and the form of the pelvis is constantly undergoing alteration to the period of adolescence, when it at length attains a tardy maturity. Thus the osseous covering which protects the generative organs is not completed,

* Rigby's Midwifery, p. 185.

until the time when they are prepared to enter upon their proper function. It is important therefore to attend to the changes going forward. In the infant pelvis the unfinished ilia are short, rounded, very patulous, and without any foss. The brim of the pelvis looks almost directly forwards, in consequence of the pubis lying so much below the sacrum, that a line passing horizontally backwards from the symphysis pubis would pass through the extremity of the coccyx. The antero-posterior measurement of the brim is the longest, the transverse is the shortest, just as in the lower animals. There is scarcely any pelvic cavity; the ischia are closed in; and consequently the tubers approximate, and the arch of the pubis is contracted: hence the transverse measurement of the outlet is very small, the antero-posterior equally long, and, being almost parallel with that of the brim, it resembles in this repect also the pelvis of quadrupeds. From this extreme, a gradual change goes forward, until the pelvis assumes its permanent character. Now it may happen that this alteration of the pelvis is so arrested in the middle of its progress, that no further change of shape takes place, but, nevertheless, that the pelvis continues to increase, just as you see in monstrous fœtuses an arrest of development at the sixth week of gestation magnified into a monstrosity in the full-grown child. Compare, for instance, this pelvis, which



Child's Pelvis. No. 12.

No. 12. Large Female undeveloped Pelvis compared with young Pelvis.

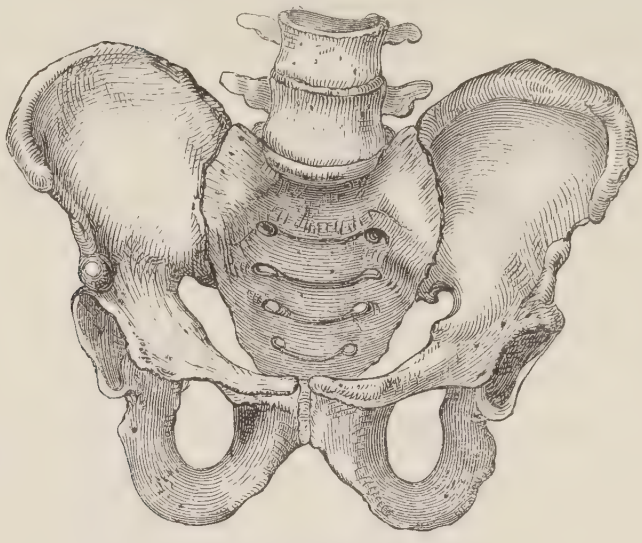
is rather a large one, with the young pelvis, and you will observe

the resemblance between them; the antero-posterior of the brim ($5\frac{1}{8}$ inches) longer than the transverse, the transverse of outlet proportionately diminished, and the cavity rather shallow: yet this pelvis is above the standard size, any difficulty or delay in the passage of the head could only arise from the outlet being incomplete. This also shows that the development of the pelvis may be arrested although its size continues to increase. But an arrest of development may take place, and the growth also be retarded: you may have in the adult woman the pelvis of the girl, with all its proportions below the standard, but not irregular or deformed. This had been pointed out by Mr. Shaw* some years ago; and the manner in which it occurs is very clearly explained. The rate of growth of the whole body is not equal. In the infant, the head, thorax, and upper extremities are much more advanced in their formation than the pelvis and lower limbs. In the adult, it is the reverse, the latter exceed the former in their proportionate size. But if, from any cause (as rickets), the general growth of the bones be retarded, the pelvis and lower limbs will not increase so rapidly as they should do; they will still retain something of their immature character; consequently the pelvis may be too small although not deformed. It is possible such may have happened in the cases reported by Busch and quoted by Rigby. The development of the pelvis may be almost completed, and yet be too small for the passage of the head; and, as the difficulty may happen just at the time of puberty, it becomes an objection to early marriages. During the growth of the pelvis, the transverse and oblique measurements of the brim are constantly increasing and the outlet becoming wider; but they do not begin to exceed the antero-posterior until after puberty, as may be readily perceived in the altered shape and carriage of the female at that time. At puberty, therefore, these measurements may only equal the antero-posterior, the outlet and perhaps the cavity being still in diminished proportions. Thus the young girl, although perfectly well-formed but pregnant at too early an age, may be the victim of a difficult labour, simply from this cause.

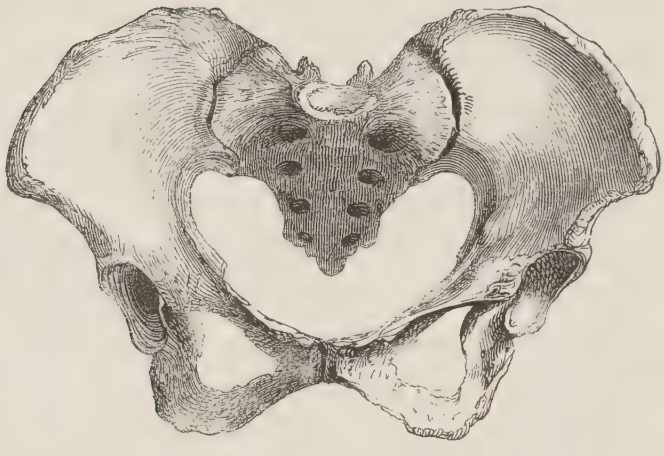
Another deviation from the standard pelvis is *when it assumes the character of the male pelvis;* and, as this circumstance is much more frequently the cause of severe labour than is generally supposed, or at least than is stated, it deserves your particular attention. The contrast between these two pelves must at once strike

* Med. Gazette, Vol. xvi. p. 45.

your attention. This resembles the male;—



No. 17. The Male Pelvis.



No. 18. The Female Pelvis.

this, the female pelvis. Comparing them together, you find the iliac bones of the male more upright, the crista ilii rougher and more waving, and the iliac fossa rather deeper.

The brim of the pelvis is more triangular than in the female, in consequence of the transverse measurement being less. Its axis is also directed more upwards. The cavity is much deeper; anteriorly, the symphysis pubis is narrower and longer, often ossified; laterally, the planes of the ischia are closer to each other; and, posteriorly, the sacrum is longer, narrower, and rather straighter, hence it is something like an obliquely truncated cone, inverted. The ischio-pubic rami form a more acute angle, which measures generally between 60° and 70°. The tubers of the ischia are closer, and if the coccyx be much curved, the outlet of the pelvis is very much closed in. The male pelvis is also much more ossified, and is consequently heavier than the female pelvis.

The cause of this difference must be at once obvious to you, if you recollect the different circumstances in which each pelvis is placed, and the law which seems to be observed in the growth of bone, viz. that it bears a strict relation to the purpose which it is intended to fulfil. If it be for an osseous covering, its size corresponds exactly to the development of the organs it protects: thus the alterations of the cranium keep pace with the varying development of the brain; a deformity from sinking of the thorax is produced when the lungs are compressed. If it be as a centre of muscular action, it is strengthened and increased directly as the action of the muscles attached to it. Apply this rule to the pelvis, and you find one organ, and that an important one, absent in the male which exists in the female: hence the pelvic cavity is narrower in the former. The pelvis is also the centre of the most powerful muscular actions in the body; and where those muscles are stronger, and are called more frequently into action, they exert a proportionate influence upon the pelvis; therefore the male pelvis is more ossified and heavier than the female, and its shape is such as will give its muscles points of insertion the most favourable to their action: hence the distance between the opposite attachments of the same muscle is, as far as possible, lessened; consequently, in the male pelvis the ilia are more upright and nearer to the linea alba; the acetabula are closer, in order to diminish the distance between the pelvis as a centre of motion and the thigh-bones; and thus the arch of the pubis is narrower and the tubera ischii closer than in the female pelvis. If we have sufficiently explained this principle, let us consider for a moment how far the female pelvis might be influenced by it. It is true that the uterus is here contained; and therefore we cannot explain by its absence any narrowness of the pelvic cavity which may exist: nevertheless, if we suppose the muscles connected with the pelvis to be large, strong, and constantly exerted, the effect would be nearly the same; the acetabula would be drawn closer to the centre, the planes of the ischia would converge more, not, as in the diseased pelvis, protruding into the cavity, but by the bone in its growth adapting itself to the diminished distance. In a similar manner the ilia would be more upright, and the pelvis of the female would gradually assume many of the characters of the male. Such is frequently the case with women in the rural districts, who are strong, healthy, and constantly employed from early youth in carrying weights, and in other active muscular

exertions. The difficulties offered by such a pelvis, are altogether different from those of the diseased pelvis, which, if you study what is written on the subject, would seem to be the only source of all the embarassments that are met with. The obstacles, therefore, which the female pelvis may present to the passage of the head, when it approaches the characters of the male pelvis, deserve your attentive consideration. The triangular shape of the brim is not generally an impediment, because, although the transverse measurement is diminished, the oblique is sufficiently wide, and the head will usually pass into the cavity. But here all the difficulties seem to centre: anteriorly, the symphysis pubis is narrower and more unyielding; even a deposition of bone is sometimes found behind it, which may be extremely dangerous, if the intervening soft parts are pressed against it by the head: posteriorly, the promontory of the sacrum offers no opposition; but the sacrum itself being straighter, there is less facility in the head performing the lateral rotation which has been already described to you; and this difficulty is still more increased by the convergence of the ischio-pubic rami: the head is obliged to descend much lower in the pelvic cavity before it can escape under the arch of the pubis, and it is prevented from doing so in consequence of the space being so much lessened by its funnel-shape. In addition to this, the tubers and spines of the ischia are more ossified, the one thicker and rougher, the other larger and more projecting; thus as the head advances, its passage becomes more and more impeded, until it is ultimately arrested, perhaps close to the outlet. In women of this description, it is possible, also, that the head of the child may be more than usually ossified, and the action of the uterus is always strong; so that a most disadvantageous combination of circumstances may take place in a healthy pelvis of this kind. On another occasion we shall have to refer to it; at present, we would only request you to notice its anatomical peculiarities, as it is important thoroughly to understand them; and here again we would observe, that the bones of the extremities will be a useful guide. The wrists and ankles are large, the phalanges thick and short: hence the old popular opinion amongst midwives, that "a thick, short hand is a bad sign when a woman is in labour," has a more just foundation than what, at first sight, might appear reasonable.

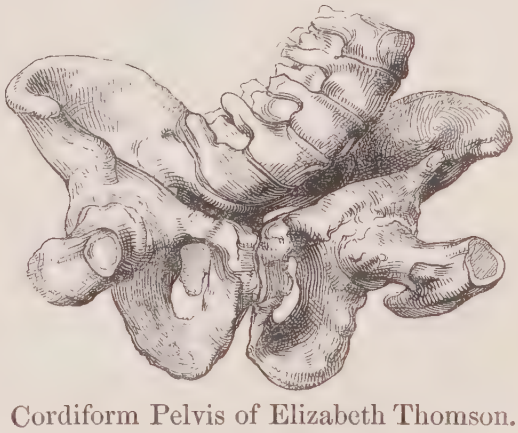
The last of the deviations in the pelvis to which I would direct your attention is, *where there is an irregularity and a want of corre-*

spondence between its different proportions. The effect produced when the ilia are too patulous or too upright, has already been explained to you. In the brim of the pelvis there is a great variety in the direction of its axis. It may be too upright; and if the pelvic cavity be wide, it will cause prolapsus uteri in the manner that has been stated: but the axis is more generally in the opposite direction, and approaches too much the horizontal line. When this is the case, the weight of the gravid uterus is thrown very much upon the lower part of the abdomen, its parietes gradually yield to the pressure, and the uterus projects much more forwards than it should do. Sometimes, after several pregnancies, the abdomen has become so weak as to give it no support whatever; and it has been reverted over the pubis so as to rest on the thighs. We shall have again to point out how such a deviation may cause considerable delay in parturition. The greater inclination of the promontory of the sacrum to one side than the other has been already alluded to. The cavity of the pelvis, although sufficiently well-formed, often varies very much in shape and depth: it may be round, oval, triangular, deep or shallow, and yet cause little alteration in the passage of the head. One variety of this kind, however, deserves notice, as it forms a pretty accurate contrast to the pelvis resembling the male. It is also funnel-shaped; but the funnel is reversed. There is rather less space in the brim than in the standard pelvis, it is a little more oval, having its short axis (antero-posterior) less than 4 inches; but the cavity is wider, the planes of the ischia more apart, and the outlet much more open than the normal pelvis. It is almost doubtful whether a pelvis of this character may not be *slightly* diseased, and consequently that it was beginning to assume something of that shape, the extreme of which forms the distortion of rickets.

Fig. 1.

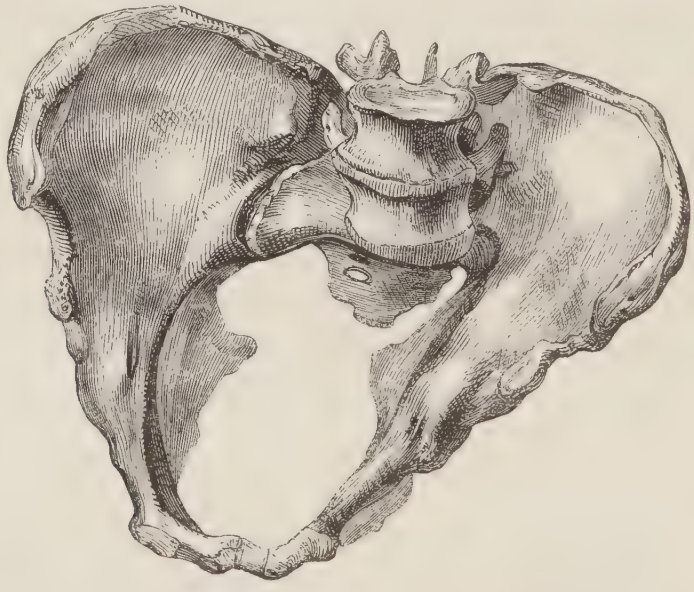
Ovate Pelvis of Elizabeth Sherwood.

Fig. 2.



Cordiform Pelvis of Elizabeth Thomson.

From these varieties in the healthy pelvis, let me now direct your attention to those which are *diseased*, and which form the second class of exceptions to the standard pelvis. A very great difference may be observed in the shapes of the distorted pelvis. In one variety (Fig. 1) you find the brim not only oval, but inclining to an hour-glass shape by the close approximation of the promontory of the sacrum to the symphysis pubis: at the same time the cavity is shallow and open, and the outlet very wide; it is the extreme of the pelvis above alluded to. In another example (Fig. 2), you find the ilia very upright and almost doubled on themselves. The brim is called cordiform, that is, it resembles the ace of hearts, but when the distortion is great, it approaches much nearer to the letter Y. The promontory of the sacrum and the pectineal eminences are quite close, and the bodies of the pubic bones are doubled back upon each other. The cavity is quite contracted in consequence of the planes of the ischia being pushed into it by the heads of the thigh-bones. The sacrum looks as if it were broken; it is bent up so abruptly at the coccygeal extremity. The tubers of the ischia are scarcely two inches apart; and the ischio-pubic rami nearly parallel; hence the pubic angle is, in some cases, only 10°.



The obliquely ovate pelvis of Naegele.

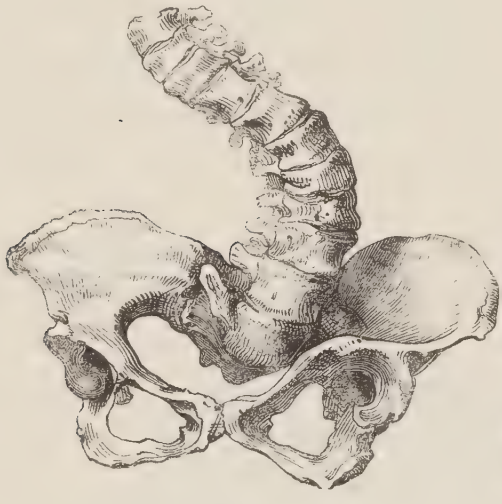
In a third instance, one side of the pelvis is of its usual shape; and the opposite seems to run almost in a straight line from the sacro-iliac synchondrosis to the pubis, as if while soft, it had fallen on that side and were flattened. These three are the leading varieties we meet with in the *deformed* pelvis; but from the two former there are numerous deviations, still, however, preserving

their specific characters. The first is generally described as the deformity from *rickets*, and as being caused in infancy; the second, as deformity from *mollities ossium*, and produced in the adult by that peculiar disease. The third variety has been known only within the last few years; and we are indebted for our knowledge of it principally to the distinguished Naegele. Let us first compare the ovate and cordiform pelves, and consider the reason why the shape of one differs so much from that of the other; we shall then inquire into the nature of the diseases to which these changes are attributed; and, lastly, consider the new variety of Naegele. In order to understand the cause producing the difference of shape observed in either of the pelves alluded to, it is not necessary to enter upon the consideration of the disease that is said to be the cause of it. Rickets and malacosteon agree in the one result—softening of bone; and it is sufficient to assume this condition of the pelvis to explain, from other causes, the different appearance of each. Let me direct your attention therefore to some of those causes.

There are two forces constantly acting upon the pelvis, which, in its healthy state, it is always able to resist by the mechanical perfection of its structure: one force is caused by the weight of the body from above, and the resistance of the thigh-bones from below; the tendency of the former is to press the promontory of the sacrum inwards and downwards; that of the latter, to press the acetabula inwards, upwards and backwards, towards the sacrum. Another force is the action of the muscles attached to the pelvis. A careful examination of the effect which these forces must have on either pelvis, in relation to the circumstances in which it is placed, will sufficiently explain the cause which modifies their form. They act very differently on the adult and on the infant pelvis: in the former, a line passing through the centre of gravity would fall rather within; in the latter, in consequence of the straightness of the spine, it would fall outside and before the pelvis. In the one case, if the pelvis yielded, the spine and femurs would press in towards the centre—the cavity of the pelvis; in the other, the weight of spine would fall in front of the pelvic cavity, while the acetabula would press up behind it. Hence the effect on the cavity would be, that when the line of gravity fell within it (as in the adult pelvis), it would be pressed inwards; when beyond it (as in the infant pelvis), it would be drawn outwards by the divergence

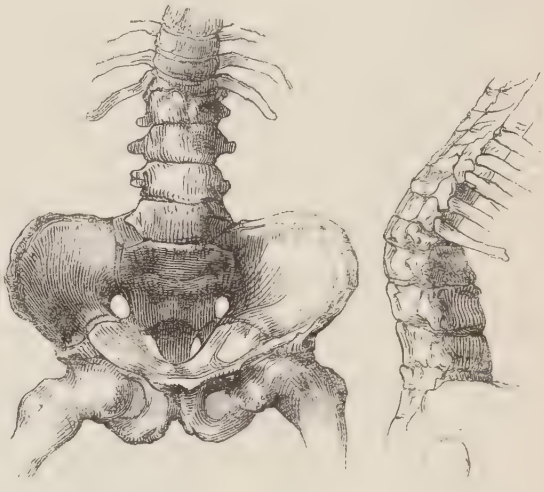
of the acetabula, the sacrum pressing down between them. Of necessity, therefore, the softened adult pelvis would take the shape called cordiform; while the infant pelvis would be transversely lengthened. In this explanation, it is assumed that the spinal column preserves in either case, its proper direction, and that it is not altered by disease. But it frequently happens (although by no means constantly) that the spine is softened and bent, as well as the pelvis; this circumstance would modify the shape of the pelvis, by altering the line of gravity. You have here (Fig. 2) the pelvis of a child distorted like the adult pelvis—cordiform; but there is a posterior curvature of the lumbar vertebræ, by which the weight of the body is thrown more upon the pelvic cavity.

Fig. 1.

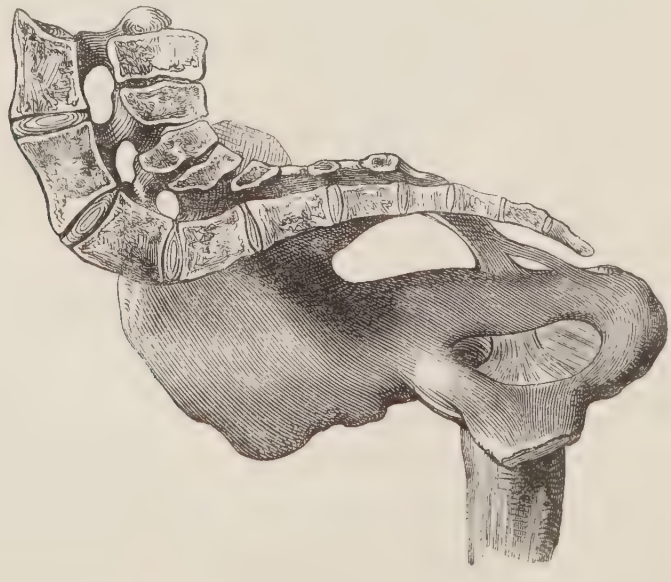


Ovate pelvis with lateral curvature of spine.

Fig. 2.



Cordiform pelvis with curvature backwards in a child.



Anterior Curvature of Spine, with a singular Deformity of the Pelvis. (*Moreau*).

Moreau, in his Atlas of Plates, gives a remarkable instance of the opposite kind: an adult pelvis, in which the spine just above the promontory of the sacrum is bent so much forwards, that the brim of the pelvis looks rather downwards. In this you see clearly that the weight of the body falls in front of the pelvic cavity, while the acetabula are pressed up behind it, consequently it so far resembles the oval pelvis, that its transverse measurement is increased. It differs from the oval pelvis in the conjugate measurement not being lessened: but the cause of this is obvious; the pubis lies completely behind the promontory of the sacrum, almost opposite the coccyx, which nearly rests upon the tubers of the ischium. Therefore, although the distance between the pubis and sacrum, measured directly backwards, is greatly diminished, that between the pubis and promontory is, if anything, increased, in consequence of the latter projecting so very much before the former. These exceptions, therefore, seem rather to prove the rule. Let us now consider the effect of muscular forces. In the motions of the body there are two sets of muscles connected with the pelvis to be considered, each having a distinct office to perform: one set, passing anteriorly and posteriorly between the pelvis and the thigh-bones, keep the pelvis fixed in its position; these, therefore, would act very powerfully in distorting the softened bone to which they are attached, but would manifestly produce a much greater effect when the body is upright and the pelvis is made a centre of motion, as in the adult pelvis, than when the body is bent forward and moves less upon the pelvis, as in the child. Such we find to be the case: the lower portion of the sacrum and the coccyx is bent nearly at a right angle by the great gluteal and pyramidal muscles, and closes up the outlet. Anteriorly, the effect is not so apparent in the adult pelvis, because it is counteracted by the acetabula and ischio-pubic rami being pressed in towards the centre; but you may still perceive the edges of these rami more everted, and the pubic arch itself immediately beneath the symphysis, wider than it ought to be. The other set of muscles are those that maintain the body in its erect position: posteriorly, the dorsal; and anteriorly, the abdominal muscles. The tendency of the former is to draw the sacrum towards the spine, and thus to increase the projection of the promontory: the effect of the latter is to draw the ilium more upright,

and to render it more irregular. The action of these muscles will therefore explain to you the character of some of the distortions in the adult pelvis.

In the infant pelvis, their influence is modified by the altered position of the body. In this case, the weight from above presses down upon and tends to separate the thigh-bones more from each other; the muscles, therefore, passing between them and the pelvis, will draw that portion of the pelvis to which they are attached outwards: hence the ischio-pubic rami are more separated, and the tubers of the ischium more apart than natural; but the distance of the thigh-bones being increased, the coccyx must still be drawn forwards by the muscles attached to it; consequently, the outlet is much more open than it ought to be, and the abruptly curved sacrum becomes the only impediment to the escape of the head. In this explanation of the distortions of the pelvis, we have confined our remarks to mechanical causes alone, and have made no allusion to the nature of the disease that gives rise to the softened state of the bone which prepares the pelvis for these alterations. We did so, in order that you might separate in your minds, the deformity of the pelvis and the disease to which the distortion is attributed, and that you might not suppose, as sometimes has been imagined, that the deformed pelvis is oval because it is ricketty, or that its cordi-form shape is the necessary consequence of mollities ossium. Let me now direct your attention *very briefly* to these diseases; and perhaps we may be able to remove another error almost as popular, that rickets is alone met with in childhood, mollities ossium in the adult. The term *rickets* has its origin in ραχις the spine, because spinal distortions form so prominent a feature in the disease; but the term *mollities ossium* might be equally well, if not better, applied to it. It is met with generally at that period of infancy (dentition), when there is a formation of new bone going forward, and arises when the demand for ossific matter is not sufficiently supplied. Whatever be the cause that deranges the health of the child, imperfect nutrition, impure air, or hereditary disease, the effect is the same, the blood does not supply the want that is felt; the teeth are always very late in their appearance; the bones have not firmness to resist the forces that act upon them, and hence the deformity. Under proper management, the child

generally recovers from the disease, but not from the effects of it; and the pelvis, distorted in infancy, is never restored to a perfect state. Now this softened state of the bones can scarcely be considered as an essential disease; rickets is only one of the effects of a general derangement of the health in which other structures than bone are equally affected, and then the question arises, whether the same causes, acting at a later period in adult life, may so derange the health as to produce rickets? Whether, in fact, healthy girls brought into large factories, or other confined situations, may have their health ultimately so deranged as to have rickets, and consequent deformities of the pelvis? If such were the case, the ricketty pelvis in these instances would be cordiform and not oval. We have every evidence, if we call to mind the number of instances in which spinal deformities occur about the same period, that these distortions of the pelvis are likely to take place, in the same manner as they do in infancy, from a deficient supply of osseous matter; that rickets is the consequence of a general derangement of the health; and therefore, you must not confound it with mollities ossium, which is a distinct and very rare disease. *Mollities ossium* is accompanied by much more urgent symptoms, startings, restlessness, pains like rheumatism, more or less through the body, and general fever; there is also a white sediment found in the urine. The disease is seldom arrested, but pursues its course more or less rapidly, until the bones are so altered that they consist only of thin shells covering a grumous liver-like substance, they bend in all directions, and may be cut through with a knife. One of the most striking cases of this kind, you will find in Professor Cooper's Surgical Dictionary, the case of Madame Suppiot. Another equally remarkable, is recorded by Mr. Solly.* If you read them with attention, and consider their true characters and the course of the disease, you may perhaps arrive at the conclusion, that a pelvis softened by *mollities ossium*, is not likely to offer a very great resistence to the head of the child. Such instances, however, have occurred when the progress of the disease has been arrested; and those *extreme cases of distortion* which have rendered the Cæsarian section necessary are generally caused by this disease. You have here an instance, in the pelvis from which this cast is taken, of the extent of the

* Med. Gazette, 1842–43, p. 510.

deformity. The case which it illustrates, was that of Elizabeth Thomson,* upon whom the operation was performed, by Mr. Wood, of Manchester.† But such cases taken in comparison with the general number of deformed pelves, are only remarkable exceptions "rari nantes in gurgite vasto," which by no means authorises us to consider the cordiform shape of the adult pelvis, as an indication that mollities ossium was its cause. If, therefore, we may assume that derangement of the general health, arising from other causes than mollities ossium, close confinement, poor diet, impure air, or hereditary disease, may produce deformities in the adult pelvis, just as in infancy, you have the source of a class of cases (unfortunately too large) where these deformities are met with. You will find them in the large manufacturing towns and districts, perhaps also among the poor needle-women of London, sometimes even in the higher ranks of the aristocracy, and in all these, the deformity of the pelvis will present those characters more or less, of which this cast is the extreme. Such patients are a perfect contrast in their appearance, and in their pelves, to those strong active women having pelves like the male, and as both are equally liable to difficulty in parturition, it is important to remember the distinction between them. This we shall consider in a future part of the course; at present, we would merely direct your attention to some of the external characters, which accompany this condition of the pelvis. The peculiar and well-known aspect of scrofula may often be observed; but this is not always the case. It is rather in the osseous system you will find the safest guide; the extremities of the bones are large, the teeth imperfect and uneven, the hands fine, but the points and joints of the fingers thick, the nails are short and easily broken, the ankles are large and generally bent in towards each other. Along with this, you may sometimes have a slight curvature of the spine, but you must be cautious in assuming that the pelvis is deformed because the spine deviates from its proper direction. Here, as in the former instances, the extremities will be the safest indices of the character of the pelvis.

It is not necessary to dwell upon the varieties that are met with in these two forms of distortion. It seldom happens, for instance, that the promontory of the sacrum projects forwards exactly in the

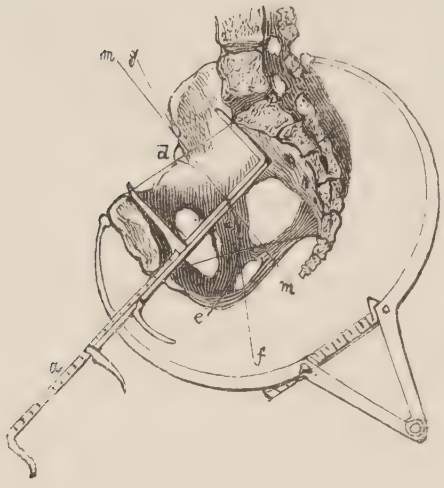
* Vide p. 29, Fig. 2. † Memoirs of Med. Society (Manchester)? Vol. 5.

middle in the antero-posterior measurement; it generally inclines to the right or left side. This has been explained by Baudeloque, on the supposition that "it is because the rickets has not equally affected all the bones of the pelvis, nor equally hurt all their junctions: and because the attitude which the child takes in walking or sitting, may change a little the direction of the compressing power which I have just mentioned."* This explanation seems to me quite unnecessary. If you take a softened pelvis, and try with a moderate force to press the promontory forwards in the middle line towards the pubis, you will find it much more difficult to do than to give it an inclination to either side. When the softened pelvis is compressed between opposite forces, its tendency is to become slightly twisted on itself, and therefore to alter the direction of the sacral promontory.

The next variety of deformed pelvis to which we would direct your attention, is the pelvis of Naegele, which he calls "the obliquely ovate." One side is quite normal, but the opposite is not at all expanded; on the imperfect side, the sacro-iliac synchondrosis is ossified. It might therefore be explained by supposing that absorption of bone, the consequence of disease, had taken place at that symphysis, and thus produced the deformity; but we have no evidence, in the history of these cases, of any such previous disease; the assumption is consequently gratuitous, and the pelvis still remains a problem to be solved. We are indebted to Dr. Knox, of Edinburgh, for a very rational attempt to do so, which further observations may, perhaps, render successful. Dr. K. attributes it to arrest of development at the period when the ossification of the sacrum is incomplete; that one side of the pelvis advances to completion, while the opposite remains stationary; and that in the adult pelvis you have one side perfect, but on the opposite, the undeveloped pelvis magnified, just as if the lateral halves of the full-grown and infant pelvis were joined in the middle. This view seems to be supported by the fact, that the sacrum on the affected side is incomplete; but it is right to state that that the remaining portion of the bone on that side does not shew the same deficiency of development.

The concluding subject to which I would direct your attention, is to the different modes of measuring the pelvis, and to the variety of pelvimetres: these need but a brief description.

* Baudeloque, by Heath, vol. i. p. 60.



Contouly's pelvimetre is a straight, graduated rod, upon which slides a smaller one; each has an upright, just like a shoe-maker's rule, and the pelvis is measured by placing one upright against the sacrum, and sliding down the other, until it rests against the symphysis pubis; the distance between each is given on the scale. How this can be managed in the living pelvis, with all the soft parts attached to it, and the uterus, or perhaps, the head, in the way, I must leave you to find out. Baudeloque employed a different instrument, a pair of callipers. He expected that by measuring between the antero-superior spines of the ilium in one direction, and from above the spinous process of the sacrum to the symphysis pubis in another, he could calculate the pelvis. We have already explained to you the uncertainty of any conclusion as to the pelvis, derived from the distance between the ilia. Little dependence, therefore, can be placed upon the transverse measurement. You are indebted to your late respected Professor Davis for a proof, that just as little reliance can be placed upon the antero-posterior. Baudeloque assumed that the thickness of the base of the sacrum was always three inches, therefore if the callipers gave seven as the antero-posterior distance, the true measurement of the brim would be four inches, and so on. Dr. Davis put this to the test. He measured the distance between the promontory of the sacrum and the middle point of the spinous ligament passing from the last lumbar vertebra to the sacrum, in seventeen pelves, taking them indifferently, well formed and distorted. The following are his results, in which you must recollect that the soft parts being absent, an additional source

of error was removed (vide table*); you see that there is a full inch difference in the thickness of the base of the sacrum, which would be no trifling matter, if added or taken from the conjugate measurement of the brim. These two instruments are the best known and most frequently employed, especially on the continent. But there are others also employed.

The late Mdme. Boivin, aware of the objection to Contouly's pelvimetre, thought that it might be improved, and she contrived an instrument by which the antero-posterior distance was taken differently. One curved rod was passed into the rectum to the promontory. Another, sliding upon it, but capable of being raised to a given angle, was passed into the vagina; when there, it was pressed up to the pubis, and the angle formed between both rods measured on a scale, gave the antero-posterior distance. If you recollect the direction which the rectum takes, you will perceive that the rectal-rod either passed to the left side of the promontory or dragged the rectum out of its position in front of it. Much dependance could not therefore be placed upon this.

Besides these modes of measuring the pelvis, none of which can be depended upon, there are what have been called "digital measurements;" or, in other words, the experienced accoucheur, from constant habit, when he passes the fingers or hand into the vagina, will form a very accurate estimate of the space in the pelvis. This is done in different ways: if one or two fingers are pressed towards the promontory of the sacrum, and if they at all approach it,

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* In Fig. 1, pelvis, the distance was 3 inches.
„ 2, „ „ $2\frac{7}{8}$ „
„ 3, „ 4, „ 5, „ „ $2\frac{5}{8}$ „
„ 6, „ „ $2\frac{13}{16}$ „
„ 7, „ 8, „ 9, „ „ $2\frac{3}{4}$
„ 10, „ 11, „ 12, „ „ $2\frac{3}{8}$ „
„ 13, „ 14, „ 15 „ „ $2\frac{1}{2}$ „
„ 16, „ „ $2\frac{1}{4}$
„ 17, „ „ 2

it is certain the promontory projects too much, otherwise this never could happen, as you will find, if you try the experiment on the dried pelvis, sometimes as much of the hand as the vagina will admit, is introduced; if, the sacrum below the promontory and the pubis are only touched, when the fingers are separated, it indicates sufficient space; if it be impossible to separate them, the contrary: and from the degree to which the fingers are compressed, the amount of disproportion is estimated. In some instances it was impossible to get more than two or even one finger within the pelvis.

Table of Measurements in Nine Diseased Pelves.

No. in Museum.	Num.	Inclined Plane of Promontory.			Plane of Brim.				Cavity.		Outlet.		Arch of Pubis.	Character of Pelvis.
		Prom. to Pubis.	Prom. to L. P. E.	Prom, to R. P. E.	Ant. Post.	Transverse.	Left Oblique.	Right Oblique.	Ant. Post.	Transverse.	Ant. Post.	Transverse.		
23	1	$4\frac{1}{2}$	3	$2\frac{7}{8}$	$4\frac{1}{2}$	4	$3\frac{7}{8}$	4	$5\frac{1}{2}$	$3\frac{3}{8}$	$4\frac{1}{4}$	$3\frac{1}{4}$	40	Cordiform.
24	2	$3\frac{5}{8}$	$2\frac{1}{4}$	$2\frac{6}{8}$	$3\frac{7}{8}$	$4\frac{5}{8}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{3}{8}$	$3\frac{5}{8}$	$4\frac{3}{8}$	$3\frac{1}{2}$	40	Ditto.
25	3	$4\frac{1}{8}$	$2\frac{5}{8}$	$2\frac{5}{8}$	$4\frac{1}{8}$	$4\frac{3}{8}$	4	$4\frac{1}{8}$	$5\frac{1}{8}$	$3\frac{3}{8}$	$4\frac{3}{8}$	$1\frac{1}{2}$	10	Ditto.
26	4	2	$\frac{6}{8}$	$\frac{5}{8}$	2	$2\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{8}$	$2\frac{7}{8}$	$3\frac{1}{2}$	$2\frac{6}{8}$	10	Cast of Elizabeth Thomson's Pelvis, delivered by Cæsarian Section, by Mr. Wood.
27	5	3	$2\frac{5}{8}$	$2\frac{6}{8}$	$3\frac{1}{4}$	5	$4\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{8}$	$3\frac{5}{8}$	70	Ovate.
28	6	$2\frac{7}{8}$	$2\frac{6}{8}$	$2\frac{1}{2}$	$2\frac{7}{8}$	$5\frac{4}{8}$	$4\frac{6}{8}$	$4\frac{6}{8}$	$3\frac{1}{2}$	5	4	$4\frac{1}{8}$	85	Ditto.
29	7	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{5}{8}$	$2\frac{6}{8}$	$5\frac{1}{4}$	$4\frac{6}{8}$	$4\frac{6}{8}$	$3\frac{1}{2}$	$5\frac{1}{8}$	$4\frac{5}{8}$	$4\frac{6}{8}$	90	Ditto.
30	8	$1\frac{7}{8}$	*$1\frac{7}{8}$	*$1\frac{3}{8}$	$1\frac{7}{8}$	$4\frac{5}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$2\frac{7}{8}$	$4\frac{5}{8}$	$2\frac{7}{8}$	$4\frac{3}{8}$	85	Wooden Model.
31	9	$1\frac{1}{8}$	*$1\frac{6}{8}$	*$1\frac{7}{8}$	$1\frac{1}{4}$	5	$4\frac{1}{4}$	$4\frac{1}{2}$	$2\frac{1}{4}$	5	$2\frac{7}{8}$	$4\frac{1}{2}$	100	Cast of Elizabeth Sherwood's Pelvis, delivered by Crotchet, by Dr. Osborne.

* The oblique measurements of Pelves 8 and 9, are taken from the side not from the centre of promontory.

LECTURE III.

MECHANISM OF PARTURITION.

Definition of Labour—Divisions of Labours by various Authors—Division into Natural, Difficult, Preternatural, Complex—Definition of Natural Labour—Stages of Labour. Arrangement of the Muscular Fibres of the Uterus, on the External and Internal Surfaces. The Effect produced by the Contraction of the different Sets of Fibres—Manner in which the Dilatation of the Uterus is accomplished—Use of Liquor Amnii. Order of Uterine Contractions—Wigand's views—Objections to them—Dewees' explanation of Uterine Action—Objections. Different Conditions of the Os Uteri—Dilatable—Rigid—Inflamed. Influence on the Action of the Uterus.

We are now prepared to enter on the consideration of Parturition; a subject which embraces the most important questions we have to bring before you, and which will require your most serious attention, in order properly to understand the principles of midwifery.

At the termination of the period required for the complete developement of the ovum, a new series of operations are entered on, for the purpose of giving birth to the fœtus which has been matured; these are included under the term Labour. It usually commences at the completion of the ninth month of gestation; in some instances it occurs before that time, when it is called Premature Labour. In this comprehensive sense, therefore, we would define Parturition to be—*the action of the uterus to expel its contents when the fœtus is sufficiently mature to sustain respiratory life.*

There are many circumstances depending either upon constitutional peculiarities, irregular formation, or upon accident, which may derange parturition or render it dangerous; hence, labours have been divided and subdivided to meet these different conditions. Some adopt only two divisions. The first includes those labours which proceed regularly to their termination without interruption. The second embraces those which do not do so.

The one is the rule, the other the exception; but as the exception includes several varieties, this second class is subdivided into corresponding heads. Others place the most usual form of labour, termed *Natural*, in the first, and then add separately two, three, or four subsequent divisions, according to the importance which they attach to these deviations. In this manner, from two to seven divisions have been made, as you will perceive in the table which is placed before you.

DIVISIONS OF LABOURS BY VARIOUS AUTHORS.

Natural / Eutochia	Difficult / Dystochia	with 15 subdivisions or orders.					Merriman
Natural / Eutochia	Abnormal / Dystochia	with 6 subdivisions					Rigby
Natural	Laborious	Preternatural	..	..	..	..	Dewees
Natural	Unnatural with 6 orders		Complex with 6 ord	..	..	..	Churchill
Natural	Difficult	Preternatural	Complex	..	..	..	Denman
Natural	Instrumental	Preternatural	Complex	..	..	..	Davis
Natural	Laborious	Preternatural	Anomalous	Flooding	..	..	Blundell
Natural	Premature	Preternatural	Tedious	Laborious	Impracticable	Complicated	Burns

These numerous divisions, to which many more might be added, are a sufficient reason for not wishing to complicate the subject by proposing another. It is preferable to adopt that which is most generally known, quite as distinct, and is in many respects more simple and practical, than some of those before you. Denman's division is sufficient for our purpose; we propose it to you for your selection, and shall consider labour under the several heads of *Natural*, *Difficult*, *Preternatural*, *Complex*. Denman defines labour to be *natural*, "if the head of the child present; if the labour be completed in twenty-four hours; and if artificial assistance be not required." Labour is called *preternatural*, when some other part than the head of the child presents. It is called *difficult labour*, when it exceeds twenty-four hours; and *complex labour*, when some accidental cause of danger occurs which may render interference necessary.

It is of the highest importance that you should have a clear view of the whole series of phenomena which constitute parturition; for, unless you perfectly comprehend the changes which are going forward in the uterus, and have an accurate knowledge of the means adopted by nature to accomplish her purpose, you can never understand the principles of midwifery: your practice must be empirical; and however indebted to chance you may be for success, you will always be exposed to the risk of committing

* Denman, p. 165.

some fatal mistake. It, therefore, becomes our duty to explain to you the series of operations, by which the delivery of the child is effected. We would desire, at the same time, to direct your attention to the beautiful application of mechanical contrivance employed by nature to effect her object.

In order to study parturition efficiently, it is necessary to divide it into certain stages. The means by which the uterus is opened is not the same as that by which the child is forced through the pelvis; and again, the manner in which the placenta is separated and expelled is different from either; hence, labour has been divided into three stages, sometimes into four, and even five. The most usual division is that of Denman—*the first stage* being the dilatation of the os uteri; *the second*, the expulsion of the child; and *the third*, the separation of the placenta. Other authors subdivide the first into premonitory and dilating stages, and some divide the second stage into two, as you perceive in this table.

Stages of Labour by different Authors.

1st Stage.	*2nd Stage.*	*3rd Stage.*	*4th Stage.*	*5th Stage.*	*Authors.*
	Dilating . . .	Expulsive	. . . . .	Placental	Denman.
Premonitory .	Dilating . . .	Expulsive	. . . . .	Placental	Velpeau.
	Dilating . . .	Passage through the pelvis.	Expulsion	Placental	Jno. Clark.
	Dilating . . .	Occiput under the arch of the pubis.	Expulsion	Placental	Merriman.
Premonitory .	Dilating . . .	Rupture of membranes and passage of the head.	Expulsion	Placental	Naegele.

Of these divisions, we would propose to you that of Denman; it is the most generally adopted, and seems to be that which is marked out by nature herself.

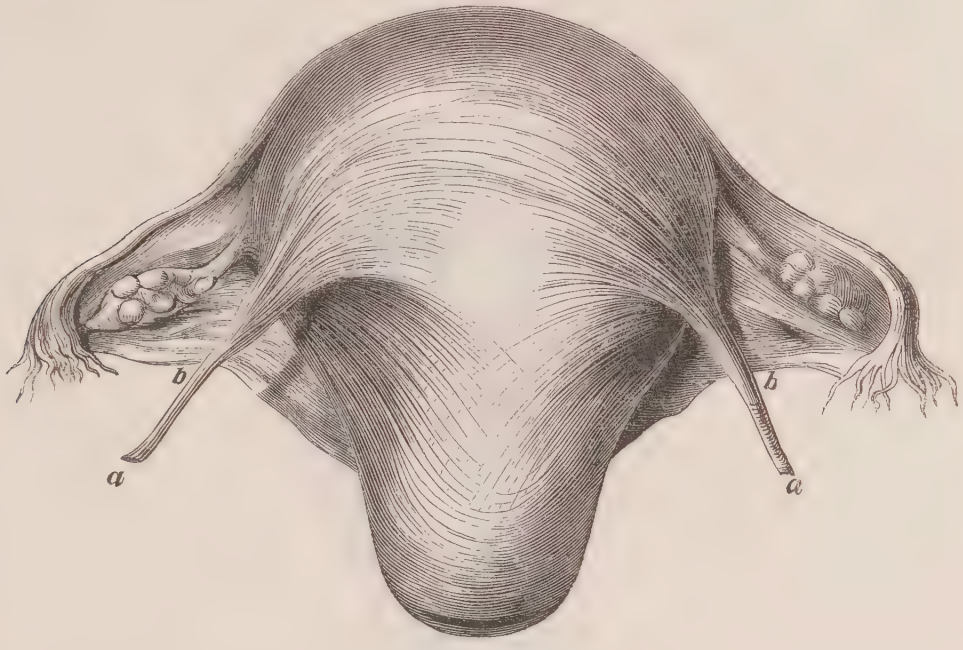
The first stage is dated from the opening of the os uteri to its complete dilatation. Denman adds to this definition, the rupture of the membranes and the discharge of the liquor amnii. This, however, renders the division imperfect, because the membranes often are not ruptured until late in the second stage, and occasionally remain unbroken when the head is expelled. This addition, is therefore unnecessary, and causes confusion.

The second stage commences when the os uteri is perfectly dilated, and terminates in the expulsion of the child.

The third stage is occupied with the expulsion of the placenta.

Before describing the manner in which the dilatation of the uterus takes place, it is necessary to recapitulate very briefly the arrange-

ment of the muscular fibres of the uterus, which has been detailed in a former lecture.



Muscular fibres on the external surface of the uterus, terminating in the round ligaments *a b*.

The fibres *on the external surface* form two broad fan-shaped muscular layers, spreading from the round ligaments over the fundus uteri. *On the internal surface*, there are three distinct sets of fibres: two of these surround the Fallopian tubes in a concentric arrangement. The third set pass circularly round the body of the uterus, and the outer fibres of the two former layers gradually pass into and intermix with those of the latter. The mass of fibres lying between the external and the internal layers have no determinate direction, but may be supposed to give increased power to those we have described. Sir C. Bell, in his valuable paper "On the Muscularity of the Uterus," has mentioned fibres which pass in a "vortiginous" direction from the fundus to the mouth of the uterus. Such, then, is the arrangement of the muscles or muscle of the uterus, as far as it has been demonstrated. Let us now consider their action. *The external muscular layer* slowly contracts for some time before labour has actually commenced, and draws the uterus gradually towards the pelvis. By this means, also, the fundus is maintained in its proper direction, and prevented from inclining too much to either side. This gradual contraction is unaccompanied by pain, and therefore is not taken notice of; but its effect in altering the size of the abdomen, and making it less

prominent, has always been observed, and noted as a premonitory sign of labour. These fibres also serve a useful purpose when the dilatation of the os uteri commences: the fundus being thus supported, the fibres on the internal surface contract more efficiently.

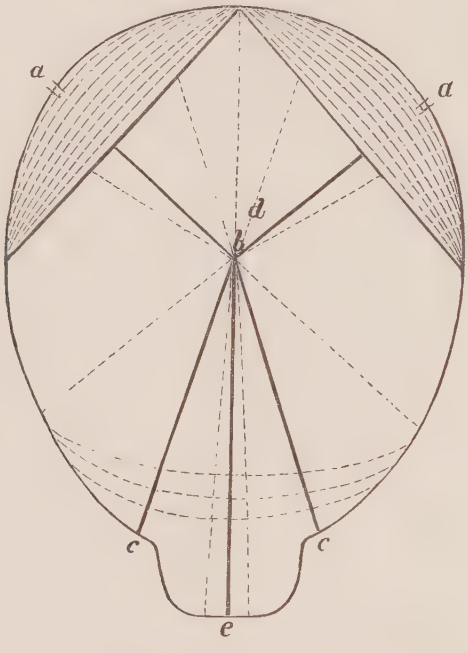
Exaggerated view of the fibres on the internal surface of the uterus: *a a*, the orifices of the Fallopian tubes.

Uterus inverted, to show the *natural* appearance of the fibres on its internal surface.

The action of *the internal sets of fibres* requires a more careful examination, inasmuch as different and, it appears to me, incorrect

explanations have been given both of the arrangement of these fibres and of the manner in which they contract. Besides this, it is necessary for you to have a correct view of uterine action, and the order observed in these contractions, to enable you to notice the deviations from it that occur. We shall therefore consider each separately. *First, the effect produced by the contractions of the different sets of fibres. Secondly, the order in which these contractions take place.*

When the fibres surrounding the Fallopian tubes contract together, the fundus uteri is equally diminished on all sides, and their combined effect, conveyed through the medium of the liquor amnii, is precisely the same on the mouth of the uterus as if the fibres passed down vertically and acted directly upon it. In order to render this intelligible, I shall have to ask your patient attention for a few moments.



The lines *a*, *b*, represent the direction of the force of the fundal muscles: *c d*, the direction of that of the circular muscles of the body of the uterus: *d e*, the combined force of these muscles.

The dotted right lines represent the direction of the force reflected by the liquor amnii; the dotted curved lines, the direction of the circular fibres of the body of the uterus.

Let us suppose a line (*a d*,) to pass from the opening of the Fallopian tube of one side of the uterus to the opposite, in such a manner as to represent the direction of the force of the fibres

surrounding it. This line would pass obliquely downwards to the opposite side. If, therefore, these fibres alone acted, the fundus on that side would be diminished in its size, and the contents of the uterus pressed toward the lower section of the opposite side, but not against the os uteri. If, further, two such lines (*a d*), passing from the orifice of each Fallopian tube represented the force of each set of these concentric fibres, the intersection of these lines would be the common point where these forces meet, and, to a certain extent, are opposed. The combined force must, therefore, take an intermediate direction equi-distant from both lines, which would be represented by a line (*d e*) passing in the axis of the uterus, and through the os uteri. It follows, therefore, that when the fundus of the uterus contracts equally, the resulting force must be communicated to the os uteri, as perfectly as if the fibres passed vertically from the fundus to the mouth of the uterus.

When the circular fibres of the body and cervix contract, their tendency is to render the uterus more and more cylindrical, according to the degree of their contraction, at the same time that they close in the cervix. Again, if the uterus were emptied of its contents, the simultaneous action of all these different sets of fibres would be, to draw the parietes equally towards the centre of the cavity. But when the uterus is gravid, and makes an effort to expel the fœtus, they cannot all contract in this manner.

The fundal muscles are those which chiefly effect the dilatation of the os uteri and the expulsion of the child, the fibres of the body and the cervix remaining comparatively passive. It has already been explained to you, that their united action is in the direction of the os uteri; but there is still a necessity for a means by which the result of that action should be perfectly conveyed to it. This is accomplished by the fluid enclosed within the amnion, which acts with a distending power upon the os uteri exactly equal to the combined force of these muscles. The muscular bands, described by Sir C. Bell, must also have the effect of expanding the os uteri by drawing it upwards. The circular fibres of the body and cervix resist the efforts of the fundus to distend them; and the force of their resistance is also communicated to the contained fluid. This force is therefore, as it were, reflected upon the os uteri, so that the whole uterus might be said to act as one muscle in dilating the mouth. The os uteri has been generally

considered to possess circular fibres, its action to resemble, in some degree, the sphincter muscles in other situations, and its dilatation to be the effect of their relaxation. The existence of these circular fibres at the os uteri has never been proved. Hunter could not demonstrate them; Sir C. Bell could not trace them out.* If a sphincter muscle exist in that situation, why should not its fibres be as distinct and as easily made out as the sphincters of other hollow muscular viscera? Neither does the manner in which the os uteri dilates support this assertion. Its expansion is very gradual, it yields slowly to the power described, and does not resemble the comparatively sudden relaxation of a sphincter muscle. Were it similar, rapid labours (at least so far as the dilatation of the os uteri is concerned) would be the rule, not the exception. It would be incorrect, then, to attribute the resistance offered by the os uteri to muscular contraction. It seems more probable, that the firm, highly-condensed tissue that forms the cervix of the virgin uterus, still retains, in its altered state, many of its original characters; that this tissue, although more unfolded, is still sufficiently compact and elastic to offer a great degree of resistance, and that its dilatation is effected by the incessantly repeated efforts of the uterus slowly overcoming and expanding it. Such a view seems to be fully supported by the observation of labour in its first stage, where we can perceive the os uteri first becoming thinner, and then progressively (not suddenly) opening. It has been stated that the sudden relaxation of the mouth of the uterus, after a continued contraction, can only be explained on the assumption of its muscularity. The same effect, however,

* "I have not succeeded in discovering circular fibres in the os tincæ corresponding in place and office with the sphincter of the other hollow viscera; and I am therefore inclined to believe, that, in the relaxation and opening of the orifice of the uterus, the change does not result from a relaxation of the muscular fibres surrounding the orifice. Indeed it is not reasonable to conceive, that the contents of the uterus are to be retained during the nine months of gestation by the action of a sphincter muscle. The loosening of the orifice, and the softening and relaxation which precedes labour, is quite unlike the yielding of a muscular ring." Sir C. Bell, on the Muscularity of the Uterus.—*Med. Chir. Trans.* vol. iv. p. 346.

Dr. William Hunter, whose perfect accuracy of description is now established, states, "The cervix uteri, where the penniform rugæ are situated, had not such regular nor so large fasciculi as the rest of the uterus. In the body of the uterus, the fibres are very regularly circular. The fundus was made up of two concentric circular planes of fibres, at the very centre of which was the orifice of the Fallopian tube."—*Anatomical Description of Gravid Uterus*, p. 27.

may be observed in other tissues besides muscle; the perinæum, for instance, often resists, for a long time, the action of the uterus, and then yields suddenly to its full extent, so that the head is most unexpectedly delivered, and yet the distended portion of the perinæum is not muscular. Besides, these sudden dilatations are only exceptions to the general rule. In ordinary cases, dilatation occupies a certain period of labour (often a very long one), and the mouth of the uterus yields very gradually to the power employed.

We would now direct your attention to the means provided by nature, to prevent the danger which might arise during this process. If the uterus exerted its full power upon the undilated os uteri, and if the unyielding head of the child were driven forcibly against it, the almost certain consequence would be, that the irritation would excite increased resistance, and ultimately terminate in inflammation of the mouth of the uterus. To obviate such an effect, nature interposes *a fluid medium* between the power and the resistance. The liquor amnii contained within the membranes, occupies the cavity of the uterus, and when its parietes contract upon it, the force exerted is (as we have explained) by this means, accurately conveyed to the os uteri. When the latter dilates in the slightest degree, the fluid insinuates itself within the smallest opening, and expands it by a direct lateral pressure against its edges. The power of the uterus is thus made to act in the most favourable manner for distending its mouth.

Other advantages are also gained. The os uteri may dilate irregularly; but any attempts to overcome forcibly the undilated portion, is prevented when the force is conveyed through a fluid, which, while it readily yields to an undue resistance, still maintains an equable pressure upon the edges of the os uteri. Any irregularity in the action of the uterine fibres, is also, to a certain extent, obviated, because these contractions, although irregular, being still conveyed by the fluid, are thus equally communicated to the os uteri. Further, so long as the tissue of the uterus intervenes, it is necessary to moderate the great power which the uterus is capable of exercising to dilate it: this is effected by the liquor amnii. The force conveyed by a fluid you are aware, does not act in one direction only, but is distributed to every part of the surface to which the fluid is applied. The force, therefore, which is exerted to expand the mouth of the uterus,

being communicated by a fluid, is not only directed against the os tincæ, but against the fundus and sides of that organ. The fundus, consequently, is opposed, not only by the os uteri, but by its own action reflected by the liquor amnii. Hence, so long as the fluid remains and the os uteri is undilated, the more powerful the action of the fundus, the greater is the resistance to it. The actual force employed, is therefore very moderate, and any sudden or violent effort at distension is altogether obviated. You may observe this in the character of the pains during this stage. You will find, that, however severely they may commence, they last but a short time, and the effect on the os uteri is comparatively slight. If these short, though severe pains, be contrasted with the long-continued and powerful pains which follow them when the liquor amnii is discharged, and the os uteri dilated, the difference in the effect will be sufficiently obvious. As a means, therefore, of conveying the whole muscular power of the uterus upon the os uteri—of moderating and equalizing the force employed—of dilating the mouth of the uterus without exciting irritation—the liquor amnii is of essential importance.

We shall now consider *the order* observed by the uterus in the contractions which take place. This may be ascertained experimentally. For instance: when the hand is passed into the uterus after delivery, to remove the placenta, we find that it may remain for some time in the cavity without exciting its contraction, but the moment the hand is being withdrawn, the fundus instantly contracts, and as it passes along the vagina, the contractions are continued from above downwards; so also, in other instances, when the os uteri is only irritated by the fingers of the hand introduced into the vagina, and an attempt is made to dilate it, the fundus immediately contracts, not the os uteri. You have thus a very favourable illustration of the reflex nervous function. Hence we infer that the order of uterine contractions is from the fundus downwards, and that the action is commenced there.

In opposition to this view of the order of uterine contractions, there is the authority of Wigand, who gives an explanation altogether different from what we have stated. In order to place his opinion clearly before you, I shall quote the following passage from Dr. Rigby's work (p. 99), in which Wigand's views are faithfully given:—

"In examining the course of a true pain, we shall find the

contractions of the uterus *do not begin in the fundus, but in the os uteri*, and pass from one to the other. *Every pain which commences in the fundus is abnormal;* and either arises from some derangement in the uterine action, or is sympathetic with some irritation not immediately connected with the uterus, as from colic, constipation, etc. We very seldom find that a contraction of the uterus which has commenced in the fundus, passes into the cervix and os uteri, and becomes a genuine effective pain; usually speaking, the contraction is confined to the circumference of the fundus, without detruding the fœtus at all. When a genuine pain comes on, so far from the head being pressed against the os uteri, it at first rises upwards, and sometimes gets even out of reach of the fingers, *whilst the os uteri itself is filled with the bladder of membranes;* if it had commenced in the fundus, instead of the inferior segment of the uterus, so far from the head being drawn up at the first coming on of the pain, it would have been forcibly pushed down against the os uteri. In the course of a few seconds, the contraction gradually spreads over the whole uterus, and is felt especially at the fundus; the head, which has been raised somewhat from the os uteri, is now again pushed downwards to it, and seems to act as a wedge for the purpose of dilating it: it is not until the whole uterus is beginning to contract, that the patient has a sensation of pain. We may therefore, consider that a genuine uterine contraction consists of certain phenomena which occur in the following order:—First, the os uteri grows tight, and the presenting part rises somewhat from it, then the rest of the uterus, especially the fundus, becoming hard, the patient has a sensation of pain, and the presenting part of the child advances."* Now, if we desired an additional evidence to prove that the fundus was the first part of the uterus to contract, and not the os uteri, we could not have a stronger proof than that advanced by Wigand to support a contrary opinion—viz., the head, when the contractions commence, getting, "even out of reach of the fingers, whilst the os uteri is filled with the bladder of membranes." In Wigand's explanation, the influence of fluid pressure seems to be altogether forgotten. The immediate effect of contraction commencing at the fundus would be to compress the liquor amnii which of necessity forces its way before the head, on to the mouth of the uterus. The fluid in this position re-acts against the head with the same power that it is

* Wigand, op. cit. vol. ii. p. 197.

compressed, and therefore pushes it up until the increasing contraction of the fundus forces the head down again, so that you perceive the phenomena quoted are quite consistent with the statement that uterine contraction begins at the fundus; in fact, it could not be otherwise, so long as the waters remain in the uterus. But if the contraction commenced from below, the fluid must be driven upwards towards the fundus, and that portion between the os uteri and head pressed aside, at least in the first instance, so that the head might be easily felt when the pain commences, although not so afterwards; but the reverse is the case, and you will find that in those cases where the liquor amnii is in large quantity, that it is difficult to feel the head at all, except in the interval of the pains. "The tightening of the os uteri," alluded to by Wigand, seems to be another source of error on this point, it being generally confounded with muscular contraction of the os uteri. It seems to me to be produced by the pressure of the fluid downwards against the sides of the uterus, combined with the increased determination of blood towards the os uteri, which arises from the vessels at the fundus expelling a portion of their blood during its contraction. The os uteri is rendered fuller, and the lips are more closed than before; hence the opinion that it is muscular contraction, the evidence for which does not seem to me sufficient to establish so important a fact. Having placed before you the opinion of Wigand upon one point connected with the action of the uterus, it would be improper to omit the explanation given by another eminent authority, of the mode in which the uterus contracts. Dewees adopts a different view of the mechanism of dilatation from what has been stated to you, not a difference as to the order of uterine contraction, but as to the manner of it. Dewees assumes that the longitudinal fibres which pass from the fundus to the os uteri, are the antagonists of circular fibres passing round the body of the uterus. The contraction of the former shortens the uterus, and distends the circular fibres, which, stimulated by this distension, contract, in opposition to the longitudinal fibres; that "the effect of this compound action is to direct the body to be moved towards that part of the organ which offers the least resistance to it, and this is the small opening called the os uteri; the fibres which surround this opening and oppose its immediate dilatation gradually become weakened by the superior strength and persevering action of the longitudinal fibres; and after a

struggle of greater or less severity and duration, are obliged to yield; and in their quiescence the dilatation of the uterus consists. In the whole of this arrangement, we [Dewees] can see no necessity for the mechanical agency of the membranes acting on the circle of the os uteri like a wedge, which Dr. Denman speaks of as important to its dilatation, for every day's experience proves that the most perfect and most speedy relaxation of the mouth of the uterus takes place without any such influence."* In this explanation, Dewees has assumed what yet remains to be proved. We have no sufficient evidence that the arrangement of the fibres of the uterus into longitudinal and circular is as antagonist muscles;† and if we assume such to be the case, and that they act in opposition to each other, the effect of the collision must be communicated to the liquor amnii; but how the membranes could resist the effect of this struggle it would be difficult to understand, when we know that change of position, walking across the room, or other such trifling causes, are sometimes sufficient to rupture them, from the gravitation of the fluid alone, and therefore the greater force arising from the action of the fibres of the uterus against each other, must break them much more frequently than

* Dewees, p. 181.

† When these Lectures first appeared in the "Lancet," it had been stated inadvertently that there was no evidence of the *existence* of longitudinal and circular fibres. The mistake was not perceived until they were again revised for publication. It was not intended to deny the existence of these fibres, but the kind of action assigned to them by Dewees,—that of antagonist muscles. The description given by different observers of the situation and arrangement of the uterine fibres being dissimilar, it was our wish to confine the attention of the student to those only which were the most obvious, and which are quite adequate to explain the action of the uterus, viz., the external layers which draw down the fundus of the uterus, the concentric fibres round the orifices of the Fallopian tubes, and the circular fibres of the body of the uterus, both of which may be observed on the internal surface. The explanation we have given of their action nearly corresponds with that of Jobert, who says:—"The direction of the uterine fibres shews how they act in freeing the uterus from its contents. The longitudinal layer of fibres, which originates at the fundus, and is inserted in the neck and vagina, tends to diminish the length of the uterus, whilst the semicircular fibres, by their action, diminish its cavity in every sense."—*Lancet*, vol. i. p. 732. The semicircular fibres that Jobert alludes to, are the concentric fibres at the fundus, and those round the body of the uterus, which he states extend down to the neck. The only difference between this explanation and that given in the text, is that the circular fibres of the body are supposed to remain passive, merely resisting distension, during the passage of the child, and that the simultaneous contraction of all the fibres does not take place until afterwards, when the uterus is empty.

what we know to be the case. Besides this, Dewees' explanation proves too much. It would make the membranes not only useless as a means of dilatation, but rather a difficulty in its accomplishment. The head of the child, directly applied to the cervix, would overcome the resistance of the circular fibres much more efficiently than the liquor amnii, so that the most favourable kind of dilatation would be that which occurs when the membranes are ruptured at the commencement of labour. It is very well known that this does not happen; and Dewees seemed to be quite aware of the difficulty this fact presented. He attempts to get rid of it by another assumption, which is, that the uterus is surprised in action by this circumstance, before the natural stimulus is given to it. "In consequence of this, the uterus is made to embrace the child closely, by virtue of its tonic power, and is by this thrown into the most violent and painful contractions, very often by the unequal surface which the child's body presents, the evacuation of the waters preventing the lower part of the uterus from being fully stretched, by the contractions of the body and fundus forcing them (the waters) down against it."* But in place of the waters, there is the large, round, and unyielding head of the child forced down upon the lower part of the uterus, which one would suppose more efficient for the purpose of mechanical distension.

We have felt it our duty to place before you those opposite views as to the dilatation of the mouth of the uterus, lest you might hereafter be confused by finding explanations of the action of the uterus, supported by respectable authorities, which are in contradiction to what we have stated to you, and which we had passed by unnoticed. We have already pointed out the advantage of the liquor amnii; hence you will find that the time at which the membranes are ruptured, often makes a material difference in the effect produced upon the mouth of the uterus. If they are ruptured when the dilatation is very slight, the suddenly increased power of the fundus, forcing the head of the child against the os tincæ, soon excites irritation, prevents its expansion, and sometimes causes inflammation. But if they are broken when the uterus is sufficiently open to allow the membranes to protrude into the vagina, and the contractions of the fundus to increase, it is probable that the dilatation will be advanced more rapidly, because of the diminished resistance from below, and the increased

* Dewees, p. 182.

force from above. This is not, however, invariable. It occasionally happens, that even under these circumstances, the os uteri becomes irritated and retarded in its dilatation.

If we have succeeded in making you acquainted with the mode in which the uterus acts in dilating the os tincæ, and the means provided for controlling the great power it is capable of exercising, we would now direct your attention to the nature of the resistance presented to it—viz., to the os uteri itself. This part of the uterus varies greatly in its density and firmness; it consequently offers different degrees of resistance to the fundus uteri. You will recollect that the os uteri, during gestation, has gradually undergone certain changes, preparatory to its dilatation. The highly condensed cellular tissue of which it consists has become looser, and is traversed by more numerous vessels. The cervix is nearly, if not altogether obliterated, and the circular orifice of the os uteri alone remains. Its edges may be either thick, full, and soft, or extremely thin, according to the degree to which its cellular tissue is unfolded. They are always moistened with the viscid mucus, which is secreted so abundantly at this time. If the fingers be passed within the os uteri and separated, the edges yield readily to a moderate pressure, there is a very slight increase of temperature, and there is no tenderness or pain produced when the os uteri is touched. This is the most favourable state for its dilatation; it is quite prepared to yield to the action of the uterus, and is called, in obstetric language, *the dilatable os uteri.*

There are, however, many exceptions to this condition, varying with the degree to which the density of structure in the os uteri may be increased. The cellular tissue is never so loose and permeable in the first instance as it becomes afterwards; the mouth of the uterus is therefore more resisting in first than in subsequent pregnancies. Its structure retains more of its elasticity and firmness in young women pregnant for the first time, and consequently much more time is occupied in unfolding it; hence the first stage of labour is always longer in primiparæ than in those who have had many children. The os uteri is still more firm and resisting if, in addition to a first pregnancy, the woman be advanced in years: the cervix and os uteri remain close, compact, and impermeable to the moment of parturition, which may be attributed to the increased firmness and diminished vascularity

which age produces in the tissues generally. It then obtains the name of "*rigid os uteri.*" But there are different degrees of rigidity. Sometimes the structure is only *tough.* It gives way very slowly to the action of the uterus, nevertheless it yields, although, as it were, reluctantly. In such cases the os uteri may remain cool and free from tenderness, but opposes a firm resistance to the pressure of the finger, and always requires a long time before the dilatation is accomplished. There are, however, a certain class of cases in which this condition of the uterus is in the extreme. It might almost be called "*the undilatable os uteri.*" In this state, its structure is unusually dense, and feels like cartilage. The edge of the os uteri is perfectly unyielding; when thick, it might be compared to the feel of Gimbernat's ligament. If very thin, it still offers the same resistance, and is to the touch like a hole made in parchment. Instances of this extreme rigidity are met with, not only in women who are advanced in life, but in those who have been all their lives accustomed to much bodily exertion, and exposed to the vicissitudes of laborious occupations. They are generally hard-featured, coarse-skinned, muscular women, of low stature, with thick short fingers, large wrists, and the bones generally prominent. It is in these cases you meet with that form of pelvis that I have described to you, as possessing many of the characters of the male pelvis. If you should, unfortunately, meet with a case of this kind, you must be prepared for difficulties from the commencement to the termination of labour, and therefore the consideration of it deserves your closest attention.

All these varieties are included under the term "rigidity." But beside, there are cases where the os uteri becomes *rigid, although previously dilatable.* If the os uteri become inflamed, rigidity is the result of it; the os tincæ grows hot and tender, is swollen, and becomes rigid. This alteration may arise from any irritation; premature rupture of the membranes for instance, by which the head is brought into direct contact with the undilated os uteri. It is also often induced, not by accidental causes, but by too much meddling, making too frequent examinations, attempting to dilate the os uteri artificially, etc. You cannot, therefore, be too cautious in this respect. Sometimes the head of the child presses so unequally upon the os uteri as to excite inflammation in it. The head may not be directed exactly in the axis of the brim, but may rather rest upon the pubic portion of it, compressing the

anterior lip of the uterus with every pain. While the remaining portion of the mouth of the uterus expands, this remains undilated, and forms a band in front of the head. When the membranes are ruptured, the pressure is so much increased that the anterior lip often inflames and grows quite rigid. Again, there are cases where the os uteri is driven down with the head into the pelvic cavity, and the whole circle of the os tincæ compressed so tightly against the pelvis as to produce inflammation; further dilatation is arrested, the os uteri is rigid, and if it remain long in this condition, slough may be the result; the whole os tincæ has been completely separated in this manner, and expelled with the head of the child.

In conclusion, we would direct your attention to the difference in the action of the uterus, when it has to overcome an unusual opposition, arising from this state of rigidity. The contractions take place continuously for a certain time; but when the period which is usual to effect the dilatation is exceeded, or when the os uteri becomes irritated, the pains grow feeble, and the uterus often suspends its action altogether. By this means an interval of rest is gained, the irritation may subside, the patient may get some sleep, and recover from her fatigue, which otherwise might end in exhaustion. When the action of the uterus is renewed after a suspension of this kind, the dilatation is often rapidly completed. Much confusion has arisen as to the duration of labour in consequence of neglecting this fact. Its commencement is generally dated from the sanguineous discharge (*the show*) which marks the first opening of the os uteri. But if the first stage occupy a very long time, including these intervals of suspension, some altogether discard the previous irregular labour, and date its commencement from the time that the pains return regularly and continuously. Thus a labour which one author would describe as being very much prolonged, another might bring within the usual limit of twenty-four hours, meaning by this, twenty-four hours' continuous labour, and hence you will find much contrariety on this point amongst obstetric authorities. At a future time, we may have to refer to this: at present we would desire to point out to you the conclusion which is deduced from this irregularity in the uterine action. It affords an additional illustration of the principle which Nature seems to observe in the dilatation of the os uteri—*to do nothing by violence*. In all ordinary cases, the liquor amnii moderates the

action of the uterus, but if there be an unusual resistance offered to it, and the waters are discharged, the increased action does not continue; it is suspended, and again renewed; so that the object is obviously to accomplish by time what Nature avoids effecting by force.

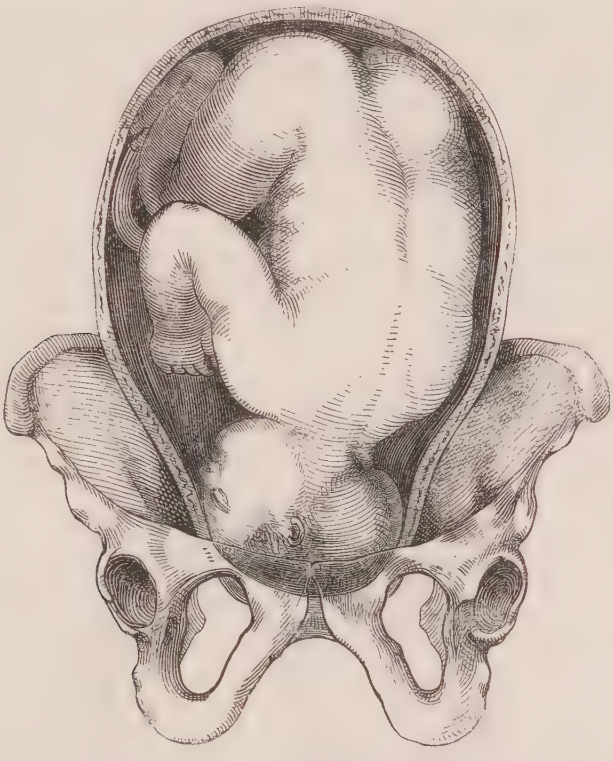
LECTURE IV.

MECHANISM OF PARTURITION, CONCLUDED.

Second Stage of Natural Labour—Bearing Pains—Passage of the Head through the Pelvis—Positions of the Head according to various Authors—Naegele's Views—Mode of distinguishing Vertex Positions—Varieties in Face Presentations—Characters of—not so dangerous as had been supposed—Dilatation of the Perinæum Expulsion of the Head—Direction of the Shoulders. *Third Stage*—Separation of the Placenta—Causes of Retention—without Hæmorrhage.

At our last meeting, we considered the means by which the dilatation of the mouth of the uterus was effected; we have now to examine the manner in which the child passes through and is expelled from the cavity of the pelvis. This is the *second stage of labour.* So long as the tissue of the uterus was interposed to the advancing head, the design of nature was evidently to moderate the action of that organ, and to prevent too violent a distension of its structure. But when this no longer arrests its progress, and the pelvis becomes the impediment, the full power of the uterus is exercised to force the head through the osseous cavity which resists its advance. You will therefore observe a marked difference in the character of the uterine contractions. Not only is the entire force of the uterus employed, but it is aided by the muscles that bound the abdominal cavity. This change will explain to you a difference in the character of the pains which are the effect of these contractions. In the first stage, they are sharp, severe, but short in their duration. They are called, in obstetric language, "*grinding pains.*" In the second stage, they are less acute, perhaps dull, but are steady and long-continued; a full inspiration is taken previous to their commencement, and the pain is expressed by a gradual expiration, accompanied by a deep tone of voice. These pains are called "*bearing pains,*" and their deep continuous groan forms a strong contrast to the shrill and almost agonizing cry that accompanies the grinding pains. When

the action of the uterus is so much increased, you must perceive the obvious hazard that would arise if the adaptation of the head to the pelvis were not exact; if the former were too large, or the latter too small, serious danger might be the consequence. Hence, the second stage of labour, and the passage of the head through the pelvis, requires your closest attention. It is necessary for you



The head above the brim of the pelvis; the anterior and posterior fontanelles being nearly on the same level.

Note.—In order to render the relation of the head and pelvis more intelligible, the pubic side of the pelvis is represented as being transparent in this and the following views.

to understand all its varieties, not in theory only, but also to take every opportunity to make yourself *practically* acquainted with them.

We would urge this upon you with the greater earnestness, because it too frequently happens that the practitioner is satisfied if he can distinguish the head, without caring much about its position, and hence decides upon the necessity for interference, not by his knowledge of the cause of the difficulty, but the length of time this stage may occupy. We would therefore recall to your recollection the observations which we made when describing to you the obstetric anatomy of the pelvis; we then pointed out to you the influence of the varieties of its shape on the progress of the head of the child, and showed you that its passage was accomplished by a combination of four distinct motions harmonizing in one effect. These we shall briefly recapitulate.

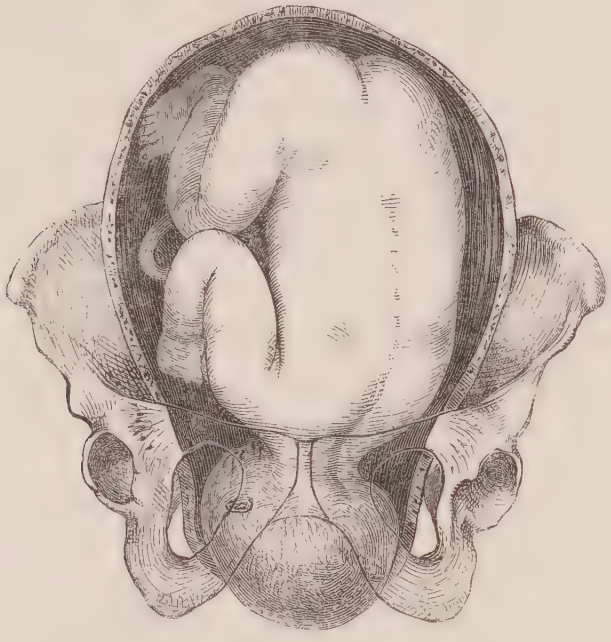
1st. When the head is above the brim of the pelvis, the forehead and occiput are nearly on the same level, but when the head enters the brim, the occiput descends lower than the sinciput, and glides a certain distance along the plane of the ischium against which it rests. The forehead then advances more rapidly at the opposite side of the pelvis, until it is arrested by the convergence of the ischium and shorter sacro-ischiatic ligament. The occiput again descends obliquely along the ischio-pubic ramus, and emerges with part of the parietal bone beneath the pubic arch. The head, therefore, might be said to oscillate on its bi-parietal measurement.

2nd. Simultaneous with this motion, there is a very slight rotation on the longitudinal axis of the head, by which that side of the head which is next to the pubis descends lower than that near the sacrum, so that the parietal protuberance of the pubic side becomes the presenting part.

The head within the pelvic cavity. The occiput and right parietal bone being the most dependent parts, the occiput resting against the plane of the ischium and obturator space, and the ear to the right of the symphysis pubis.

3rd. As the head is so advancing through the pelvic cavity, the shape of the pelvis obliges it to pass in a spiral direction; hence the head, which may enter the pelvis in the oblique or transverse measurement, is turned, as it descends, towards the conjugate axis.

4th. When the head escapes from the outlet, the occiput rests against the ramus of the pubis and ischium, and becomes a fixed point, round which the remaining portion of the head successively passes out. In some instances, the occiput rests directly against the arch of the pubis, and the head is expelled in the conjugate axis of the outlet. According to its more usual course, it passes out obliquely.



Further advance of the head through the pelvic cavity, previous to emerging from the arch of the pubis. The parietal bone, and part of the occiput presenting at the arch of the pubis—the head more in the antero-posterior direction, and the anterior again descending to the level of the posterior fontanelle.

The head, however, does not descend always in the same position, and there are accidental displacements that may retard its progress. It is necessary, therefore, to understand these deviations. Formerly, the varieties in the position of the head received but little attention. The older writers only observed the manner in which the child was expelled (Sir Fielding Ould, however, is a noble exception). They found the occiput generally towards the pubis, when the head escaped from the vulva, but sometimes the face; hence they made only two divisions, or, to speak more correctly, they considered the former to be the rule, the latter an accidental exception to it, Baudeloque, however, observed the progress of the head while it was within the pelvis, and determined the position by touch, not by sight. He described six different positions; and, since his work appeared, every division that has been made, whether into four, six, or eight positions, has been

formed on the basis which he has laid down—that of determining the position while the head was in the pelvis, and not when it was expelled from it. Authors have not agreed upon the number of these positions, nor upon their order of frequency. It will be necessary, therefore, in order to prevent confusion, to arrange their divisions in a tabular form, before describing the positions, and the mode of ascertaining them. The terms employed require a brief explanation. The position of the head is generally determined by that part of it which corresponds to the plane of the ischium, and therefore is opposite to the cotyloid cavity. If the occiput be in that situation, it is called the occipito-cotyloid position; if the forehead, the fronto-cotyloid. In the same sense you may have the occipito or fronto-pubic, and occipito-iliac; when the occiput, or forehead, is applied to the pubis in place of the ischium, or when the occiput is opposite the centre of the ilium. The occiput, also, may be to the left or right side of the pelvis; and thus you have the right occipito-cotyloid position, the left occipito-cotyloid position, and so on.

In the table before you, the numbers are placed in the order adopted by each author.

Left occipito-cotyloid.	Right occipito-cotyloid.	Occipito-pubic.	Left fronto-cotyloid.	Right fronto-cotyloid.	Fronto-pubic.	Left occipito-iliac.	Right occipito-iliac.	
1	2	3	4	5	6	...	..	Baudeloque, Dewees, etc.
1	2	...	3	4	...	5	6	Lachapelle
1	3	...	2	4	...	...	...	Naegele
3	4	7	5	6	8	1	2	Ramsbotham.

Nearly all authors agree that the most usual position for the head to pass is with the occiput corresponding to the left plane of the ischium. It is then called *the first position* (*or left occipito-cotyloid*). When the head is in this situation, the occiput has the relation to the ischium which we have stated. The forehead corresponds to the right sacro-iliac synchondrosis. The right parietal bone is lower than the left, and its protuberance the lowest part of the head, which presents. As the head advances, the occiput becomes gradually more anterior, and the forehead dips down a certain distance in the pelvis, but the parietal bone remains unaltered. As it approaches the outlet, the forehead ceases to advance, and the occiput and parietal bones press down upon the perinæum to the utmost extent, descending along the ischio-pubic ramus, in order to emerge under the arch of the

pubis. In making a vaginal examination to ascertain this position, the finger first touches the parietal protuberance; the sagittal suture is felt close to it, directed obliquely backwards. Anteriorly, and to the left side, this suture terminates in the posterior fontanelle; but the anterior fontanelle cannot yet be felt at the opposite side. The first position is chiefly determined by this situation of the posterior fontanelle; you should, therefore, recollect its distinctive characters, which we shall presently point out to you.

In *the second position* of Baudeloque (or right occipito-cotyloid), the occiput is opposite to the right plane of the ischium; the posterior fontanelle is, therefore, in the same relation to the right side of the pelvis that it was to the left in the first position, being anterior to its transverse axis. The sagittal suture passes obliquely backwards, from right to left; the left parietal bone is on the pubic side, and descends lower than the right. Dr. F. Ramsbotham places the transverse position of the head as first and second in the order of frequency, and considers the occiput more frequently opposite the ilium, at the right or left extremity of the transverse axis, than the plane of the ischium. If such were the case, the ear would be felt directly behind the symphysis pubis, in place of the right or left groin. It is certainly true that it is found more frequently near to the former than in the latter situation, which gives a plausible support to his opinion. Authors seem to have placed the oblique position of the head before the transverse, in frequency, from the circumstance, that in the recent pelvis the psoas muscles diminish the transverse measurement without affecting the oblique. It seems to me, however, to be doubtful, whether, in a pelvis of moderate width transversely, these muscles interfere much with the head in its progress, especially as they are always as much relaxed as possible during labour, and therefore yield to the pressure of the head. Judging from the opportunities of observation I have had, the head seems to be placed most frequently in the left oblique occipito-cotyloid position, but not so much so as to remove the ear from the neighbourhood of the pubis. In the third and sixth position of Baudeloque, the sagittal suture corresponds nearly to the conjugate measurement of the brim of the pelvis, only that in the former the posterior, and in the latter the anterior fontanelle, are opposite the pubis: these positions

are very rare, and are omitted by Lachapelle and others, who consider *the third position* (*or left fronto-cotyloid*) as the converse of the first. The frontal bone and anterior fontanelle correspond to the left plane of the ischium; the sagittal suture passes backwards from left to right; the posterior fontanelle is opposite, and near the right sacro-iliac synchondrosis; the left parietal protuberance is the most dependent point, and the ear is situated as in the second position, only more withdrawn from the pubis, and nearer the groin. This is Baudeloque's fourth position.

The *fourth position* (*or right fronto-cotyloid*—fifth of Baudeloque) has the frontal bone opposite the right plane of the ischium; the sagittal suture passes backwards, from right to left; the right parietal bone presents, and the right ear is opposite the left groin. Such are the principal positions, as they are given in the different works on midwifery. The diagnostic marks by which they are distinguished are, first, *the fontanelles*. In order to discriminate between occipito and fronto-cotyloid positions, you must understand the character of the anterior and posterior fontanelles, judging of them by touch, not by sight. In the dried bone, the posterior fontanelle is a triangular space. In the head of the child, the finger will often detect no space, but only a point, the centre in which three lines of suture terminate. The anterior fontanelle, being so much larger, lozenge-shaped, and having four lines of sutures terminating at its angles, can be easily distinguished from the posterior, if the eye were to decide the question; but, as we must judge by the finger alone, these characters are not always obvious. The anterior fontanelle is higher up, and more removed from the finger in fronto-cotyloid positions than the posterior fontanelle is in the first and second positions; consequently, the finger cannot reach sufficiently far to trace its exact shape. The divergence of the parietal bones may be felt, and perhaps the coronal sutures, but the two remaining sides of the lozenge formed by the frontal bone are too distant, neither can the frontal suture be felt; hence there is some resemblance to the triangular space of the posterior fontanelle, the only difference being in the greater size of the triangle in the anterior fontanelle: but in cases where the ossification of these bones advances slowly, the posterior fontanelle is large, and might resemble the anterior. You perceive, therefore, that it is possible to confound the one with the other, and that it requires practice

in examining by touch, in order to discriminate them in all cases. As a general rule, however, you will find the posterior fontanelle like a central point, in which three lines meet, the anterior more distinctly a membranous space, but usually undefined. If there be any difficulty, it may be removed by a careful examination of the second diagnostic mark — *the ear*, which may be felt on the pubic side of the pelvis, except in cases of great disproportion. As the lobe of the ear is always nearest to the occiput, you can by it determine the side of the pelvis where the occiput lies, and therefore you can distinguish the two positions which have the occiput on the left side, from the two that have the frontal bone in the same situation; but you cannot so easily decide between collateral positions the first and fourth, or the second and third. It has been stated to you, that authors have not agreed as to the second position. Baudeloque placed the right occipito-cotyloid position second in the order of frequency, and was followed by several other writers, until Naegele made these positions the subject of his observation. The result of his examinations led him to doubt the accuracy of the description which had been given, and ultimately to deny it altogether. He found, that although the head was expelled in Baudeloque's second position, it did not enter the brim of the pelvis in that direction, but that it passed down first in the third position, with the occiput towards the right sacro-iliac synchondrosis, and, as it descended, rotated gradually into Baudeloque's second position, in which it was expelled. Thus the occiput, and of course the head, might be said to describe a kind of spiral curve from right to left, as it passed through the pelvis. Naegele's explanation has been since confirmed by other observers, and is in the main correct — a conclusion which I have arrived at from personal observation. Being anxious to determine this question, I availed myself of the opportunities afforded me in the Dublin Lying-in Hospital, of putting it to the test, and found that in nearly an equal number of cases the head entered the brim in the third position as in the second, that of those which descended in the third, the majority passed without any difficulty into the second, and were so expelled, while a very few remained in their original position. The whole evidence establishes Naegele's accuracy of description, and it may be admitted that, as a general rule, the head rotates from the third into the second position, when it is

passing through the pelvis; but there are exceptions to it. The fourth position also passes into the first; but sometimes, although very rarely, preserves its original direction.*

From these varieties of the vertex presentation, we would now direct your attention to some deviations from them which are occasionally met with. It has been stated to you, that in one of the motions of the head of the child, the frontal bone descends to the level of the occiput. In some instances, however, from an accidental cause, the forehead is driven down too far, that the head becoming fixed in the pelvis transversely, its progress is thus arrested. It is essential for you to understand this cause of delay in the second stage, because it is very easily corrected; and any ignorance respecting it might lead you into the erroneous impression that the head should be delivered by instruments, because it was so long fixed in its position. When this accident takes place, the anterior fontanelle may be observed to be remarkably distinct; you readily trace out its lozenge shape, and feel the four sutures distinctly at each of the angles. The finger also passes very easily between the pubis and the head, so that there appears to be rather more space in that situation than usual. Finding, therefore, this evidence of room in the pelvis, the anterior fontanelle perfectly within reach, and, at the same time, the head not advancing, you have sufficient proof of this deviation. It is described by many authors as the *premature separation of the chin from the chest of the child.* The mode of correcting it is sufficiently simple. The head should be dislodged from its position in the interval of a pain, and the fingers pressed against the frontal bone until the uterus again contracts; the occiput will at once descend, and the labour proceed without further difficulty. There are rare instances, in which the forehead descends completely into the cavity of the pelvis, and becomes the presenting part; when this occurs, the displacement cannot be corrected, as in the former instance, and the position is so unfavourable, that the head soon becomes arrested in its progress. It acts upon the pelvis something like a

* Of seventy-four cases recently examined, the following results were noted:—

First Position.	Fourth into First.	Second Position.	Third into Second.	Third Position.	Irregular.	Face.
43	3	11	9	2	4	2

wedge, the forehead being the narrow end, and the occiput and neck of the child its broad base. The more the head advances, the more the difficulty is increased. When this accident takes place, the exploring finger feels the frontal bone traversed in the centre by the frontal suture; there is, therefore, some resemblance to the vertex position, but it may be easily distinguished, because the forehead is smaller than the occiput, and the anterior fontanelle being near, can be very easily traced. The inexperienced observer would imagine that there was more space than usual in the pelvis for the passage of the head, and might not be able to explain why its progress should be delayed; but if the finger were passed sufficiently high, he would soon perceive that the head was completely wedged in the pelvic cavity.

Sometimes there is a complete rotation of the head on its transverse axis, so that the forehead rests upon the brim of the pelvis, and the face descends into the cavity. This constitutes the *face presentation.* Two varieties of this position are generally met with. In one, the chin corresponds to the right plane of the ischium (the *right mento-cotyloid position*). In the other, the chin has the same relation on the left side (*left mento-cotyloid*). When the former position presents, the *right malar* bone and cheek are the most dependent parts, the mouth and nose being rather posterior on the sacral side. In the latter the *left side of the face* presents. In both instances, there is the same obliquity observed as in vertex positions. Two other varieties are described, where the chin is directed backwards towards the sacro-iliac synchondrosis; but I believe that they are very rarely, if ever, met with.

If we are correct in considering face positions as the result of a rotation of the vertex, the manner in which they occur might be explained in this way: so long as the head is above the brim of the pelvis, its position can always be very easily altered, and it frequently changes from one into another. If it should happen that in any of these alterations, the occiput is placed upon the brim of the pelvis, it may glide from it towards the ilium, the forehead take its place, and the face descend as described. If this were true, the first position of the face would be the result of a rotation of the fourth position of the vertex, which rarely enters the pelvis; and the second of the face, a rotation of the third of the vertex.

It is more important, however, to consider the mode of distin-

guishing these positions, because the situation of the face is such that it is exposed to great tumefaction. The face is much more vascular than the vertex; and being the most dependent part, and very much compressed, the cheek, the eye, and the portion of the mouth which presents, are always very much swollen. Even with the most careful management, the features of the child are more or less disfigured, but this may be greatly increased by frequent examinations. Unfortunately, the infant is too often a severe sufferer from this cause. The unusual characters of the position lead the inexperienced practitioner to make several fruitless attempts to determine what it is; the tumefaction is much greater than before, and the outline of the features more confused; thus serious injury to the child is sometimes the result: the eye has been destroyed in this way.

In examining a face presentation, the first point that attracts your attention is, the *irregularity of the soft surface* which presents itself. It may seem to be very easy to determine the features of the infant; but you will not find it so. The soft cheek and the malar bone have some resemblance both to the breech and shoulder, neither can you define the outlines of the features with the same accuracy by touch as by sight: it is this difficulty that leads to the frequent examinations that are made in these cases. You generally first feel the nose like a soft fleshy elevation: if this be cautiously traced, the finger passes on one side to the bridge of the nasal bones, and on the opposite, to the lips and mouth. This may be taken as a diagnostic mark of the position. When the finger passes from the lips to the gums, and from thence to the tongue, the sensation communicated by the firm ridge of gums cannot be mistaken.

These face-presentations were formerly considered to be very unfavourable, and to give rise to great delay and difficulty in the progress of labour; but this impression seems to have been created much more from the novelty of the position than from experience. In the extensive hospital at Vienna, Boer noted eighty face-presentations, and observes, "there were three, or at the most, four, where the children were born dead. None of the patients suffered in the slightest degree from any of these labours, and, *except one case*, all were left entirely to nature. In one case only, *on account* of the *weakness* of *the pains* and doubtful character of the symptoms, I deemed it necessary to terminate the labour by the

forceps."—(Rigby, p. 130.) In the Dublin Lying-in Hospital, Dr. Collins gives thirty-three cases in his report,* and states, "Four of the thirty-three were still-born. With the first, the labour lasted thirty-six hours (the only instance); the second was an acephalous fœtus; with the third, the labour lasted eight hours; with the fourth seven hours: all were delivered without assistance." Of these thirty-three cases, thirty-one were delivered within twelve hours; and Dr. Collins further adds, in explanation of the small proportion thirty-three cases bear to the total number in the report, 16,654:—"Some cases of face-presentation, I am disposed to think, were not noted, *delivery having taken place so very speedily* as to excite little attention, and to cause it to be overlooked" (p. 34). These statements coincide with my own observations in the same hospital. The total number of cases which came under my notice during three years, and the results of which had been noted, were 5,699; of these there was not a single face-position which required aid in the delivery, nor did the labour in any occupy twenty-four hours. The only danger, therefore, which might arise from these positions is the danger of meddling too much with them.

When the head (which we will suppose to be in the first position) approaches the outlet of the pelvis, and descends along the ischio-pubic ramus, it is opposed by *the perinæum;* when this takes place, every provision is made to obviate the effects of the struggle about to ensue. The mucous secretion flows much more abundantly from the vagina; the presenting part at first just touches the perinæum and then retreats from it, and the action of the uterus seems again to alter its character; the pains are not so vigorous as before, but for some time are shorter in their duration, and apparently less efficient. The same caution is exercised to guard against violence here as in the first stage, and you will often find the head or the membranes advancing and retreating for a long time before it descends so far as to allow the occiput and parietal bone to pass between the pillars of the pubic arch. During this period the structure of the perinæum becomes more and more unfolded, so that the delay which usually takes place in the labour at this point seems to arise much more from the feeble character of the pains than the resistance of the perinæum. At length, when the head is enabled to pass down so far that the

* Collins' Report, p. 83.

occipital portion can emerge from the outlet, the perinæum suffers its greatest degree of distension. The occiput then first rests against the ischio-pubic ramus, and as it is expelled, rises upwards towards the pubic arch. It becomes a fixed centre, round which the remaining portion of the head moves: the whole force of every pain is, therefore, spent upon the perinæum; and, if these return with much rapidity or violence, there is a danger that this part may be lacerated. In the majority of cases, however, the head retreats in the intervals of the pains, even where it seems to be almost expelled. At this time, also, the pains become much stronger, and are the severest and most trying to the patient of any that she has experienced. At the conclusion of this stage one or two very strong pains take place, by which the head is first protruded so far that it does not retreat, and it is then delivered. As soon as the head is born, you are given a favourable opportunity of confirming your diagnosis as to the position. In this, the first position, the face is directed obliquely upwards towards the right thigh of the mother, because when the shoulders and body of the child pass into the pelvic cavity, they enter the brim of the pelvis in the oblique measurement, opposite to that in which the head has passed, and therefore as the child goes through the cavity of the pelvis, the thorax and abdomen correspond to the right or superior side of the pelvis, and the face looks in the same direction.

When the shoulders are being expelled, the perinæum is again put upon the stretch, and is sometimes unequally protruded by the arms of the child, by which, if care be not taken, it might be lacerated, but as soon as they escape there is no further danger. The uterus also ceases to act with the same force, the remaining pains are weaker, so that the body and limbs of the child are very slowly expelled. Such is the manner in which the child, in its most usual position, is delivered, and this stage completed; but before entering upon the consideration of *the third stage*, we would direct your attention to the mode in which other positions of the head are expelled, and their influence on the perinæum. When the head passes out in the second position, the back of the child is to the right side of the pelvis, in the same relation as the thorax and abdomen are in the first position; the face therefore looks downwards to the left thigh. When the shoulders are passing the perinæum in this position, great caution is necessary, because you

do not feel the hands and arms coming out, as in the first position; they might therefore press on the perinæum unequally, and lacerate it without your knowledge. When the face is towards the pubis, the perinæum is very much endangered, in consequence of the greater distance to which the head must descend before it can pass under the pubic arch; and in order to do so, the direction of its motion is downwards and backwards, the reverse of what usually occurs: consequently, the perinæum suffers a much greater degree of tension than in ordinary cases, and there is a proportionate risk that it will give way. In face-positions, from a similar cause, the perinæum also suffers, but not to the same extent, because the tension upon it is only continued until the chin passes under the arch, when the pressure is at once relieved.

As soon as the expulsion of the child is accomplished, the uterus ceases to contract for some time, the interval varying from five to fifteen minutes; then the contractions are renewed, for the expulsion of the placenta. This constitutes *the third stage of labour*. These can scarcely be called pains; they bear no resemblance to those which preceded them, and are but little noticed by the patient. The manner in which the placenta is separated depends very much upon the mode in which the uterus contracts while expelling the body and limbs of the child. If the fundus receive due support from the abdominal muscles, so as to ensure a uniform and efficient contraction from above downwards, it often happens that the same pain which extruded the limbs of the child from the vulva, expels the placenta from the uterus into the vagina, where it may remain for some time. The same will occur if artificial support be given by pressure with the hand on the fundus: in either case, the uterine contractions have no further effect upon it. It would continue for some time in this situation if left to itself, and either be gradually removed from it by the slow action of the fibres of the vagina, or suddenly, by some shock from above driving the uterus down upon it; as, for instance, coughing retching, or much forcing with the slight pains which occur at this time. It is seldom, however, suffered to remain, but is generally drawn away by the funis. *Retention of the placenta* may arise from different causes. Sometimes the sphincter of the vagina closes upon it, and the placenta is thus retained until removed by the hand, or by firm pressure on the fundus of the

uterus. In other instances, the *placenta remains in the uterus* after the delivery of the child, until it is expelled by its subsequent contractions, rendered efficient by similar contractions of the diaphragm and abdominal muscles. This additional aid is required, inasmuch as the action of the uterus alone is not sufficient for the purpose. Hence, when the abdominal muscles are feeble, so that the uterus can derive no support from them, *the placenta is retained in this cavity.* This cause of retention has been generally mistaken for *inertia* of the uterus; and under this impression the placenta has been, very unnecessarily, withdrawn from the uterine cavity; it is therefore necessary for me to direct your attention especially to this point, in order that you may understand the principle upon which the management of this stage depends. When the child leaves the uterus, a very powerful stimulus to its action is removed; and this stimulus the placenta is quite inadequate to supply. The uterus, therefore, first ceases to act for a certain time, and when the action is renewed, it is weak, and continues only for a short time. If the uterus fail in discharging the placenta by a few of these efforts, it becomes accustomed, as it were, to its presence, and it no longer acts as a stimulus, but remains with the uterus imperfectly contracted around it. A very efficient means of supplying this want of irritation to the uterus, is the pressure of the abdominal viscera which surround it. When the abdominal muscles are strong, they contract upon the retiring uterus, compressing the intestines, and consequently the uterus, on all sides. These weak pains, therefore, are greatly assisted and rendered effectual by the straining efforts of the patient acting as a stimulus to the uterus from without. But the abdominal muscles are not always strong: on the contrary, in most instances, they are extremely weak, in consequence of our civilized habits. They are too often reduced almost to a state of atony from the constant pressure of the corset; hence it follows that the uterus derives little or no support from them, and the placenta is retained, not from any want of power in the uterus to expel it, but from a want of sufficient stimulus to cause the uterus to contract. There is no *inertia* of the uterus, but only a suspension of its action. It is for this reason, and to supply this deficiency, that the pressure of the hand on the fundus of the uterus, during the expulsion of the child, is found so useful; and on the same principle, as we shall have again to ex-

plain to you, the application of a bandage round the abdomen is always necessary, in order to give it proper support. This *suspended action* of the uterus, as a cause of retained placenta, must be carefully distinguished from *true uterine inertia*, which we shall allude to under the subject of hæmorrhage.

The placenta may also be *retained from irregular contraction* of the uterus, either during the expulsion of the child or subsequently. One of the fundal muscles may contract and not the other; or the fibres of the body may draw the uterus into a cylindrical shape, leaving the fundus relaxed; or lastly, there may be a spasmodic contraction of the fibres at the cervix, forming a kind of stricture.

These irregular contractions may arise, either from the too rapid delivery of the child not allowing the uterus time to follow its usual order of contraction, or from that order being inverted, in consequence of too great relaxation of the fundus, the result of deficient irritation. The effect may be, that the cervix or body contracts first, and therefore retains the placenta. Sometimes an irregular contraction of the fundus may exist and not be perceived, especially if frictions be used over the abdomen for the purpose of exciting uterine action. The anterior wall of the uterus remains firm and contracted, and the fundus seems to be so too; but if the hand be passed down towards the sacrum, and along the posterior wall of the uterus (where the placenta is often situated), it will generally be found relaxed, and, when excited to contract, often expels the placenta, which had been perhaps for a long time retained. All these irregular contractions must be corrected by endeavouring to restore the order of uterine contraction from the fundus to the os uteri. The stricture at the cervix is, however, an exception; it must be overcome, in the same manner as strictures in other places, by direct dilatation. Another cause of retained placenta is adhesion, either partial or general; but this, like uterine inertia, is so constantly accompanied with hæmorrhage, that we must defer its consideration to that part of our subject.

When none of these causes operate, and the placenta is expelled in the usual time, the uterus does not altogether cease its contraction for some time afterwards. If left altogether to itself, without being properly supported, there is a danger that there may be too great relaxation of the uterus; consequently, hæmorrhage and severe after-pains, from the attempts made by the

uterus to discharge the coagula formed in its cavity. This is one of the most frequent causes of after-pains. You have abundant evidence that it arises from the circumstance stated, because these after-pains occur far more frequently with women who have had many children, than with those who are only pregnant for the first time. In the latter case, the abdominal parieties being only once distended, retain a certain degree of tonic contractile power, which is altogether destroyed by frequent pregnancies.

If we have succeeded in placing before you in a clear manner the phenomena which take place in parturition, the contrivance employed by nature for the safe delivery of the child, and the principle which she seems to follow for the accomplishment of her purpose, we shall be enabled to enter upon the consideration of the management of labour, and you will have but little difficulty in determining the value of those rules which are laid down for your guidance. *The management of labours*, therefore, shall form the next subject for our attention.

LECTURE V.

MANAGEMENT OF NATURAL LABOUR.

Premonitory Symptoms of Labour—Evidence of the Commencement of the first Stage—Character of the grinding Pains. *Obstetric Duties of the Practitioner*—When summoned to attend—Caution respecting his Patient—Objects of the Vaginal Examination in the first Stage, before the Membranes are ruptured—Signs of the first Stage being completed—Mode of preparing the Bed, and supporting the Patient.

HITHERTO we have considered the process of parturition as an interesting subject of observation, one of a thousand illustrations of the perfect adaptation of means to the end proposed, by which nature accomplishes her purpose. We have now to enter upon the more practical inquiry; the symptoms that attend the phenomena we have described to you, and the treatment required to secure the safety of the patient. We would therefore direct your attention to the symptoms of labour, and to what are popularly called "the duties of the obstetrician."

During the period that the uterus is descending towards the pelvis, the size of the abdomen diminishes, and the patient feels much less inconvenience and distress than she did previously. Her respiration is less impeded, and she has less anxiety. In some instances, the woman seems almost to forget what has been the constant object of her thoughts for many previous months. As the time of labour approaches, some monitors present themselves to remind her of the event; sometimes the nerves are very much pressed upon, so as to cause sensations of numbness or tingling, down one or other of the limbs: both are seldom affected. Occasionally they are slightly paralyzed, and cause lameness. As the uterus begins to press more on the pelvis, the patient becomes

awkward in her carriage, and unable to walk even a short distance without fatigue. The neighbouring organs soon show the influence of the change going forward in the uterus; the bladder becomes irritable, so that constant micturition is the result. We may, however, find it in the opposite state, and the urine retained: the rectum is also affected in a similar manner, and a fæculent diarrhœa frequently precedes labour. This is always salutary, because it secures the important object of having the intestines unloaded; so also constipation sometimes takes place, especially in hysterical habits. The length of time that the rectum may remain without an evacuation, and the woman feel no inconvenience from it, is often far beyond what you might suppose; a fortnight, and even three weeks, is not unusual. In these instances, the patient is sometimes deceived, and imagines that her bowels are quite regular, because there is a daily inclination to go to stool; there is then a scanty discharge of loose fæculent matter, leaving the mass of scybalæ undisturbed. You cannot, therefore, pay too much attention to this point of practice, because when the rectum is in this state, the whole of the large intestines become distended with flatus, which causes spasmodic pains that are often mistaken for labour-pains. Should the patient escape this, and labour actually commence, the action of the uterus goes on imperfectly: the same influence which is exerted by the uterus on the rectum in suspending its ordinary action is, as it were, reflected on itself, producing a similar suspension of the uterine contractions. For some time previous to labour, the mucous secretion from the vagina begins to increase in quantity, and often amounts to an abundant viscid discharge. This change may appear even for three weeks before labour, and consequently is occasionally mistaken by the young and inexperienced mother for the well-known symptom of labour called "the show."

When this latter evidence presents itself, the discharge is tinged with more or less blood, arising from the ruptured vessels of the os uteri when it first dilates. As soon as this takes place, labour properly begins; *the patient has now entered upon the first stage.* The pains which accompany the first contraction of the uterus are slight, short in their duration, and return at long intervals. The French describe them by the expressive term, "les mouchettes." They generally also (like the mosquitos)

attack the patient at night, and are sufficient to prevent her obtaining her usual sleep, although not so severe as to call for assistance. Towards morning, however, they increase in frequency and severity; all inclination to sleep is dissipated; the woman is anxious to rise in order to change her posture, and will move from place to place, and try every alteration of position that may seem to allay her suffering.

Unless the patient has more than usual fortitude, and has great command of her feelings, she cannot help giving loud and almost agonizing expression to the pain she endures. She generally avoids to take a deep inspiration, or to use any straining effort. A short inspiration is followed by a shrill cry, which she cannot suppress. When you are accustomed to obstetric practice, you will learn to distinguish these *grinding pains* (as they are popularly called) from the *bearing pains* that follow them, by the peculiar cry that accompanies each. During the first stage, the irritability of the bladder and rectum generally continues, so that the patient has a frequent desire to evacuate them. A slight rigor may be observed in the commencement, or she may be seized with sudden vomiting. The latter is often very serviceable in those who are of a plethoric habit, because the nausea and sense of exhaustion that follow are often a means of controlling excitement, either in the mind or in the circulation. When any of these evidences prove that labour has commenced, the practitioner is generally hastily sent for. Sometimes, however, it is avoided until the pains seem to say, "He can no longer be dispensed with." If labour be preceded by false pains, he is often summoned unnecessarily, these spasms being mistaken for labour. The medical attendant, knowing that such a mistake is possible, and that even if labour have actually commenced, it will occupy some time before he can be of use, might procrastinate: he might be disposed to think that he has quite sufficient time before him, and give but a dilatory attention to the message he receives. *A greater mistake cannot be committed.* Any summons from one who has placed entirely in your hands her own safety and that of her offspring, equally dear to her, should receive instant attention; neither are you to consider the urgency as measured by your own, but by her impressions of the case. You may be called upon without there being the least necessity for haste; but by your promptitude you will gain a considerable

advantage in strengthening the confidence she has already given you. The necessity, however, may be real, and not fictitious. Cases have occurred in which the patient has been delivered before the practitioner arrived; and if such an accident arose from any negligence on his part, he must have a much greater influence over his patient than is usual, if he can recover from the effects of it.

If it be a first pregnancy that you are summoned to, it is advisable that your introduction be not too abrupt: caution in this respect is of still greater importance if called to a patient to whom you had not been previously introduced; the mere circumstance of a stranger entering the apartment of a parturient woman has caused a total suspension of her labour. Some preparation, in the way of announcement, is therefore necessary. For the same reason it would be prudent, when introduced, to direct your patient's attention as much as possible from contemplating the character in which you appear before her, to draw her away from the subject that brought you there, and to lead her to forget the office that you have to fulfil. You would not therefore catechise her too strictly about herself, or remind her of what is going to happen by too busy a display of preparation. A few minutes' conversation with the nurse is generally sufficient to learn every particular of importance; but your patient should only receive from you the words of comfort and encouragement. The nurse, however, does not require the same forbearance. It will be your duty to ascertain from her every point upon which you desire to be satisfied. When the pains commenced? Their character? If accompanied by much, or by little excitement? The state of the bowels, and whether the bladder has been relieved? If your patient has any constitutional peculiarity? You should also examine the bandage, pins, ligature, and every trifling matter which might inconvenience you, if not prepared according to your views.

Having satisfied yourself, you can then return and engage your patient, if possible, in general conversation. You may thus form your own opinion of the character of her labour. If it be in the commencement, when the pains are short and the interval between them long, you can engage her attention with facility; but if the pains are severe, these attempts at conversation had better be dispensed with. The patient should be left in charge of the nurse, because your presence may become unpleasant to

her as a witness of her suffering, and would be embarrassing, if it interfered with the necessary evacuations: you may therefore retire to the neighbouring apartment, until you have determined upon the time for taking the first important step in your professional capacity.

Making a Vaginal Examination.—Some have considered it as a matter of the first importance, that this should be done as early as possible in the labour, in order that any correction which might be required in the presentation should be effected before it was too late; as, for instance, the funis or hand coming down with the head, the head descending in a wrong position, or perhaps the shoulder presenting. In order to interfere with any of these complications, the labour must be more than in its commencement; the os uteri must be dilated, although the dilatation may be far from being complete. It would be precipitate, therefore, to require an examination before the steady frequency of the pains gives evidence that this was likely to have taken place; and therefore a vaginal examination very early in the labour, when the pains only return slowly, would be unnecessary. Neither is the object for which such an examination is stated to be made, of that importance which seems to be attached to it. The funis cannot be interfered with, or suffer any very dangerous pressure, so long as the membranes are entire. We shall presently point out to you the danger of meddling too much with supposed wrong positions of the head, as well as when the hand comes down with it. The only position that should be ascertained before the waters are discharged, is the shoulder presentation; but if you examine for this too soon, when the os uteri is only slightly dilated, and the presenting part above the brim, you might fail to detect any presentation, and even if you did, may, after all, be mistaken in the result; the hand and arm might be felt, and yet the head afterwards descend. It is certainly very satisfactory to find out that the head presents, as early as you can; but if you cannot do so in the beginning of labour, it is no proof that the position is preternatural. If you cannot, therefore, gain a decided advantage by making a very early examination, there is one strong reason for a little delay. When the patient is only enduring the first short pains that attend this stage, she has always a great reluctance to be examined; all her natural feelings and prejudices are in full play against you: she submits very unwillingly, and

complains loudly of the least pain or inconvenience you may cause her. You will not, therefore, find it easy to make a satisfactory examination; and if you fail, you may not so readily obtain her consent to its repetition. When there is *no absolute necessity*, therefore, it is better to wait until these grinding pains increase in strength and frequency; her mind is then absorbed in her present suffering; she is willing to submit to anything which may be of use to her, and is often very anxious to know whether the labour will be safe: you have also the great advantage of being able to make the examination *perfectly*, because the dilatation of the uterus has made some advance. Having determined upon the proper time for making a vaginal examination, the nurse should communicate your wishes, which are now readily acceded to: she may then place her in the most favourable position for the purpose. The patient, loosely attired in her night-dress, should lie on the bed on her left side, as near to the edge as possible, having the knees drawn up towards the abdomen. You should then wait until the pain returns; and when it is about to cease, pass the fore-finger of the right hand, anointed with cold cream, bear's grease, or any unctuous substance, within the vagina; examine carefully its condition, if it be relaxed and moistened with the usual secretion, or if dry and rigid. *Examine the rectum through the posterior wall*, which, if empty, or nearly so, feels like a thick band; but if loaded, it projects into the vagina a surface so firm and irregular, that if it were your first case you might imagine it was the distorted sacrum, or perhaps the back of the child. You should also *examine the anterior wall* of the vagina: if the fundus of the bladder should press into it; advancing slowly, *the middle finger* might then be introduced, in order that *a careful examination of the os uteri* be made. One finger is not sufficient for this purpose, unless the uterus is low in the vagina. If it be above the brim of an ordinary sized pelvis, the forefinger, or rather the nail of the fore-finger, just touches the anterior part of the mouth of the womb, and may also touch the head if it lie near to it, but scarcely any other information is gained; knowledge quite sufficient for those who only examine to find if the position be natural, but not at all adequate for the practitioner who is anxious to form a correct judgment of the time this stage might occupy, or of the causes which might retard its progress. The middle finger is longer, and reaches higher in the vagina:

with two fingers, also, you have a double advantage, from your sense of touch. When you have acquired, from long experience, a perfect tact, then one finger may be sufficient. Both fingers being introduced, pass them first along the sacral side of the vagina, and when you cannot advance them further, direct them forwards towards the pubis. If the pains have ceased and the os uteri be dilatable, having the membranes lying loosely within it, you feel what seems to be the irregular folds of a flaccid bag projecting into the vagina; examining this with caution, the edge of the os uteri, soft but more resisting, may be traced, and if the finger be passed within it, you will sometimes feel, towards the pubis, the head firm and round; you may, however, often fail, and yet the head present.

The finger should not be withdrawn until you have ascertained the state of the os uteri, as to its dilatability and density, its exact direction, as nearly as you can judge, and the degree to which it is opened. The act of withdrawing the fingers sometimes induces a pain; you may then cautiously observe what takes place,—the fulness and slight closing of the os uteri, the membranes descending as a tense bag, and the mouth of the womb tightly stretched over it: but take care of roughness, lest the membranes give way. Before the fingers are removed from the neighbourhood of the os uteri, examine the distance of the sacrum; and as they are being withdrawn, ascertain, if possible, the space in the pelvic cavity. It would be well, also, in the commencement of your practice, when it is so necessary to educate your sense of touch, to take this opportunity of examining the orifice of the urethra. For this purpose, when the fingers are being withdrawn, let the forefinger follow the course of the canal to its termination in the trumpet-shaped, semi-cartilaginous opening. Be careful, at the same time, to avoid the clitoris. In order to make a sufficiently careful examination, a little time may be required, during which the pains may return; you should then cease until they subside, noting only those points which have been mentioned. But make it a rule not to withdraw from your examination until you have perfectly satisfied yourself as to the character of the labour. Having accomplished this, a second examination during this stage, unless it be prolonged, would be unnecessary.

Exploring the vagina and uterus in this way, is called, in the popular language of midwifery, "trying a pain," or "taking a

pain." And the object assigned to it by the patient and her friends, is to learn whether the labour is safe, and how long it may last. You are, therefore, generally asked, and expected to give a distinct answer to both these questions. The first is usually easy, and may be replied to in the affirmative; but if you have any doubt, you should not precipitately sound an alarm. If you ascertain that it is a cross-birth, as shoulder-positions are called, you may state the nature of the case, and the kind of assistance required, *to the friends* of your patient, in order that they may select a consultant in case you find it necessary; but be cautious not to alarm the patient herself: it is quite time enough to inform her of her situation when you have determined to deliver her. In all other cases, the difficulty must be decided by time and further observation of the case; you should not, therefore, give way to apprehensions which may be unnecessary, or commit yourself to an opinion which the result might not justify.

The second question, as to the duration of labour, cannot be too cautiously answered. The friends may ask, "Is everything right?"—but, "How soon shall I be well?" is invariably your patient's anxious question. In order to tranquillize and encourage her, it might seem pardonable to state a period for the termination of her sufferings earlier than what you know will be the case. But such a practice would be extremely injudicious, because when the time had passed in which she expected a relief to her anguish, her disappointment would lead to impatience of further suffering, if not to a secret dread that the delay arose from some cause dangerous to herself. The result might be a suspension of the uterine action, and a still further prolongation of her labour. Along with this, being proved, as it were, a false prophet, your patient may lose all confidence in your opinion and judgment.

It is better, therefore, to err on the other side; and if you are obliged to give a distinct and positive answer, to state a period beyond that in which you expect that delivery will take place. No doubt this will give but little comfort to one who requires every consolation, but it will induce her to summon that resolution and patience under suffering, which is the peculiar attribute of her sex; and it will enable her to go through her trial more favourably, because more patiently, than if she expected more

prompt relief. Her confidence, also, in your judgment, would be rather increased if your prediction prove to be true; and if not, she would much more willingly forgive a deception which rendered her delivery an agreeable surprise. If, from any accident, the membranes are broken during this stage, a second examination is necessary, in order to determine the presentation, and to ascertain any accidental complication which might occur. If, when the liquor amnii escapes, the dilatation be slightly advanced, and the orifice of the uterus increased only an inch or two in diameter, you may expect more or less delay in the completion of this stage, unless the cervix of the uterus be extremely thin. If it be at all thick, the irritation of the head generally renders it rigid, no matter how dilatable it may have been previously. In this second exploration, therefore, a very cautious opinion should be given as to the duration of the labour. The head, if presenting, may also be felt; but the position cannot be determined until the dilatation is more increased, and the head fully in the brim. The small portion of the head which occupies the slightly dilated os uteri is not sufficient to determine anything about it; and if you pass the finger within the os uteri for the purpose of tracing the sutures and fontanelle, you will only succeed in exciting a great deal of unnecessary irritation in its tissue; neither can you define the characters of the position, through the os uteri, with sufficient accuracy to place any dependence on the evidence they give.

The time has not yet come to decide the position of the head. If this be true, then it is scarcely necessary to point out to you the absurdity of attempting to correct its supposed wrong position at such an early period of the labour. Yet this is one of the objects for which we are instructed that a vaginal examination is necessary, and are even recommended to rupture the membranes for the purpose of altering the position of the head.* The hand may be felt presenting with the head under similar circumstances, and the correction of this accident is also assigned as a reason for examining *per vaginam* as soon as possible. We very much question this necessity, or even the propriety of interfering with the presentation so soon. You will recollect, that in order to correct this malposition, the hand and arm must be pressed up above the head, and there maintained until the succeeding pain

* "If it be discovered early, it is certainly proper to rupture the membranes, and turn the vertex round, which is easily accomplished." Burns's Midwif. p. 394.

drives down the head below it. If the os uteri be only slightly dilated, and the head not completely in the brim, you will find it very difficult to accomplish this, and in the attempt you expose yourself to the double risk—1st, of increasing the irritation of the cervix uteri to a much greater degree than might otherwise take place; 2ndly, in your manipulation, you cannot press up the hand without also pressing against the head, which we have assumed has not yet passed into the brim of the pelvis. The effect of this might be, that you may just succeed in pushing it more on the brim than it had been; and the necessary consequence is, that the head not being able to pass into the pelvis, the action of the uterus is directed more upon the shoulder. The side of the face, ear, and neck, might first be directed towards the pelvic cavity, and then glide with the vertex towards the iliac fossa, while the shoulder would occupy the brim. So that, after an attempt of this kind, you would find the arm coming down into the vagina rather more than before, and after a few pains the position completely changed. There cannot be a more awkward accident than to convert a natural into preternatural labour. Therefore we would question altogether the propriety of meddling with the position thus early, because it seems to us far more probable that a little awkward manipulation would produce this derangement, than that it would take place if the position were not interfered with. In fact, nature would be less likely to blunder than you would.

What we have stated to you does not apply to the same position when the os uteri is more dilated, and the head quite within the cavity of the pelvis; we would desire, at present, only to point out to you our reasons for objecting to submit your patient to a very early examination, with a view of unnecessarily endeavouring to make corrections. The only accident which would seem to render an early examination necessary is when the funis is prolapsed. We have stated that so long as the membranes are entire, and the liquor amnii surrounds the funis, there is little danger that the circulation will be arrested. But if the waters prematurely escape, this alone renders an examination necessary; and therefore the funis may be detected in sufficient time to determine upon the course which it may be requisite to pursue. In ordinary cases of labour, such as we are now speaking of, the membranes seldom give way until the second stage has made some

progress, and often remain entire until the head of the child is almost expelled. You seldom, therefore, have occasion to make more than one examination during the first stage; and having obtained by this every information you require, it is better then to commit your patient to the nurse's charge, and to retire to the next apartment until you are again summoned by the urgency of her pains, or by some new symptom presenting itself.

The time which the first stage may occupy, when there is no cause to render it tedious, is very uncertain. It is, of course, much longer with women pregnant for the first time than with those who have had many children. It may last from twelve to sixteen hours; but where this stage is prolonged, the following stages are generally short, and sometimes bear an inverse proportion to each other. You cannot take time as a criterion to judge when the first stage is about to cease and the second to commence; but you may do so by closely observing the pains. We have described to you the character of the grinding pains that accompany the first stage ; they frequently merge into the bearing pains so gradually as to require some attention to observe the change. You may remark, when the pain comes on, that the patient is obliged to grasp firmly whatever is within her reach; she retains her breath more than before, and sometimes makes an involuntary effort to force the child down. Her voice also alters, its tone is more subdued, and she seems more patient of her suffering than before. Sometimes the complete dilatation of the uterus is marked by constitutional symptoms; there may be a slight rigor or vomiting, perhaps a strong inclination to go to stool. Whenever any change of this kind is noticed, you have just reason to suspect the commencement of the second stage, and as you cannot tell with what rapidity it may proceed, the patient should no longer be suffered to go about the room. She must now remain in bed, which should be properly prepared for her reception. The manner of doing so is thus:—A skin of morocco-leather, or a broad piece of Indianrubber-cloth, is usually placed next the bed, to protect it from being stained; and a blanket, folded very wide, enclosed in a soiled sheet, is placed underneath the hip of the patient as she lies upon the left side. They should be so fastened together, that the whole may be removed at once without difficulty. By this means the discharges are absorbed, and prevented from soiling the sheets of the bed, while these foul

clothes may be withdrawn after the delivery of the patient without disturbing her. Trifling as these details may appear to you, we must direct your attention particularly to them, because of a practice which is prevalent among the lower classes here, that seems both inconvenient and dangerous. The parturient woman generally sits at the end of the bedstead without making any change in her dress. The bed and bed-clothes are doubled up in such a manner that she can recline against them something like a sofa, and so she remains during the whole of the second stage, until she is delivered. The intention of this arrangement is, that when labour is quite concluded, the clean bed and bed-clothes may be laid down, the patient's day-apparel changed for her night-dress, and everything made "comfortable" as the midwives express it. All this may be, and often is, done without injury to the patient; but recollect the risk that is run by moving the patient so much, at a time when she should be kept perfectly quiet; and if an accident should happen, if hæmorrhage should result from it, imagine your perplexity. Her dress is in your way when you wish to command the uterus. You may not have time to get the bed laid down again, so as to place her in a horizontal position; even moving her for the purpose is dangerous. You are surrounded with a host of unexpected difficulties, and her life might even be the sacrifice of a little want of forethought. You should, therefore, always take care that your patient is loosely attired in her night-dress, and placed on her left side in the bed, guarded in the manner described, when there is any evidence that the first stage is near its completion.

When the os uteri is quite dilated, and the bearing-pains become more decided in their character, the patient is anxious to have her body fixed as much as possible during their continuance; she therefore requires to have something within her reach that she may grasp firmly. Her feet also should be supported while the pain lasts. For this purpose a sheet is generally fastened to the bed-post in such a manner that she can easily hold by it, while the nurse may support her feet by pressing a pillow against them. It is a very common practice to place between the knees a small pillow when the head of the child is beginning to press upon the perinæum, but you will find it both useless and inconvenient. The patient derives very little advantage from it; and it is constantly in the way when you wish to make a vaginal

examination, or when the head is passing the vulva. On this point we may be permitted to anticipate the consideration of the second stage towards its conclusion, and observe that when the labour has so far advanced as to render the aid necessary which this is intended to afford, much more efficient assistance may be given by the nurse, if she raise the knee moderately with one hand and support the foot with the other.

When the second stage of labour has commenced, the patient experiences much more fatigue than she did before; as it continues, she feels exhausted by the struggle, becomes heated and thirsty, and often grows dispirited. Hence has arisen the pernicious practice of giving wine, spirits, and other such stimulants "to help her pains." You must imperatively *forbid heating drinks of all kinds* to be given to the patient. Such a practice would not only increase the sense of exhaustion when the stimulus had passed away, but it might also contribute to increase greatly any tendency to inflammation which might exist in the passages, while the head is passing through the pelvis. Barley-water, tea, very thin gruel, or such like drinks only, should be given. *A free ventilation* of the apartment should also be secured; and at the same time care is necessary that your patient be not exposed to any draughts of cold air. For this purpose you must not fall into an opposite extreme, and, as is sometimes done, have the bed-curtains closely drawn to prevent all access of the air. In this manner the parturient woman has been kept in a vapour bath of impure air; an excellent excitant for miliary fever. On the contrary, it is better to have no curtains, or at least to have them only drawn sufficiently to prevent exposure to a draught of air. It is also very essential to have *as few persons in the room as possible.* You should only permit one person to remain with the nurse, *the nearest married relative* of your patient, with whom she would feel no restraint, and to whom she can communicate freely all her feelings. The officious assistance of friends should be sedulously shunned; it is often extremely disagreeable to the woman herself to have these witnesses of her suffering present; and although she may silently tolerate the inconvenience because she is conscious of the kind motive which actuates them, still it is embarrassing and unpleasant. To the practitioner it is still more inconvenient, because they are often unaccustomed to such scenes, and become alarmed at the agony their friend seems to suffer:

their faces express even more distress than the patient's, and like multiplying mirrors, reflect every pang she suffers with tenfold power. If this stage should continue longer than usual, their anxiety is proportionally increased. Anxiety is soon succeeded by a secret if not open doubt of the practitioner's competency, and their ominous expressions of distrust very rapidly produce a corresponding effect upon your patient. She soon becomes dispirited, and fearful for the result; so that at a period when it is most important that the action of the uterus should continue regularly and efficiently, it may be altogether suspended. When years have given you not only experience but station in your profession, you may not be subjected to such misgivings; but be assured, that in the opening of your career, when you are as yet but little known, and have to build up your reputation, you will be submitted to these inconveniencies, if you are not decided in preventing them.

LECTURE VI.

MANAGEMENT OF NATURAL LABOUR—CONTINUED.

Second Stage—Obstetric Duties of the Practitioner—Vaginal Examination—Its Objects—Support of the Perinæum—Its Intention and Mode of Accomplishment. *Third Stage*—Removal of the Placenta—Support of the Uterus—The Abdominal Bandage—Its Object and Mode of Application—Management of retained Placenta without Hæmorrhage.

In the preceding lecture, we considered the duties you had to fulfil towards your patient when the os uteri was in the process of its dilatation, and when THE SECOND STAGE was about to commence. We explained to you the general arrangements, both as to the bed, the apartment, and the diet required by your patient during this trying stage. In continuation we would observe that from the moment of its commencement, she must receive your most sedulous attention: she cannot now be left to the nurse; you must sit beside her, attentively observing the progress of the labour, and be prepared to act the moment your assistance is required. You have to witness a struggle of greater or less severity, in the effort of the uterus to force the head through the pelvic cavity. The bearing pains return with a regularity and strength that would seem sufficient to overcome any ordinary obstacle with rapidity, and yet the advance of the head is often slow, and its progress bears no proportion to the effort which seems to be employed. It is your duty to watch carefully the effect produced by the pains, and to sustain your patient through this severe trial with every encouragement. The proportion between the head and the pelvis must be accurately observed, the exact position of the head ascertained, and the progress which it makes through the pelvis carefully noted. More than one vaginal examination is, therefore, necessary; but you must bear in

mind, that the passages are now experiencing unusual pressure; there may be, probably, some congestion and increase of temperature, and this might be much increased if the vagina were irritated by frequent examinations. In order to obviate any injurious effects, nature provides a resource in the increased discharge of slimy mucus which now flows abundantly from the vagina. But if examinations be repeated too often, and the passages become irritated, this discharge is diminished; it may be arrested, and the parts become hot and dry, or perhaps it may be succeeded by a thin serous discharge, that rather increases the irritation. This change, therefore, in the character of the discharge, serves as a useful indication that caution is required in this respect. It had not been lost sight of by the older practitioners, who supposed that the frequent introduction of the fingers into the vagina dried up the parts by absorbing the discharge.

The *first object*, then, of a vaginal examination in this stage, *is to determine the proportion between the head and the pelvis.* For this purpose the fingers should be passed carefully between both in the interval of the pains, directing them, in the first instance, between the pubis and head, and moving them round on either side. The ear can be felt if there be sufficient space for the head to pass, but if the head be high up in the pelvis, the finger can only just touch it. If the ear cannot be reached readily, and there seems to be a want of proportion between the head and the pelvis, you have still another means of testing its degree, by examining the presenting part of the head. When it is only slightly compressed, the scalp is simply folded or puckered by the closing of the sutures; as the compression increases, these folds merge gradually into one, which ultimately forms a distinct tumour. This continues to enlarge, so that in cases of impaction of the head, it is sometimes of great magnitude. The manner in which this change takes place, and its degree, is generally a sufficient proof of the amount of the disproportion. If the tumour form very slowly, and never increase to any great size, you may infer that the head will pass safely through the pelvis; but if, on the contrary, it increase rapidly, and attain a great size, the indication must be unfavourable.

The *second object* of a vaginal examination is, to ascertain the exact position of the head. We have already pointed out to you the means of distinguishing the different positions from each

other. We shall, therefore, at present only bring before your notice those positions which we are directed by some authors to alter as soon as they are found out, in order to prevent the head becoming impacted in the pelvis afterwards.

One of these cases is when the head enters the brim in the left fronto-cotyloid position. It is assumed that this cannot pass safely, but will cause great delay and difficulty in the labour: therefore, it is laid down that the correction must be made the moment the position is ascertained. We have already stated to you the experience of Naegele, confirmed by other observers, that nature, if left to herself, will correct this deviation, by rotating the head into the right occipito-cotyloid position. The probability is, therefore, that by meddling too soon you may prevent this, and prematurely force the head into a more unfavourable position than it had been. The moment this position is detected is not, therefore, the time for interference; it is more advisable to wait and observe the course the head will pursue. It may correct itself; it may advance and be delivered in the third position without injury; it may be arrested. The last is the only condition which would justify your aid. The head may then be displaced from its situation, and pressed back in the interval of the pains, and a *very slight rotation* is generally sufficient to make it glide easily in its proper direction when the pains return. The very same observation applies to those instances where the head and hand, or even arm, descend together. This accident is often the result of the pelvis being too wide, and if so, both will be expelled without difficulty; but sometimes the arm comes down a little too much and prevents the head advancing, or the head may be arrested by the hand descending with it. In either case, the hand or arm can be very easily pushed back when the pain ceases, and so maintained until the next pain advances the head, which generally passes down very rapidly as soon as the correction has been made. When the head is in the cavity of the pelvis, there is not the same danger of displacing it as when it is only entering the brim; and consequently, our previous observations on this accident (pp. 85-86) do not apply to the present case. You should not, therefore, when these deviations occur, too hastily assume that the head cannot be delivered. It is more advisable to wait until they become causes of delay.

The *third object* of a vaginal examination is, to note the progress which the head makes. In natural labour, where no difficulty presents itself, a very few examinations, at proper intervals, will be sufficient for the purpose, because its advance is generally quite obvious; but in difficult labours, where the head makes a very slow progress, and there are other causes of embarrassment present, more care is required; their consideration, however, is beside our immediate subject. Having ascertained the position of the head, and its relation to the pelvis, the next object of attention is its descent upon the perinæum. You must, therefore, *be prepared to give the perinæum support* the moment it suffers any degree of distention. The mode of doing so, which I have been in the habit of adopting, is somewhat different from that directed by the more popular writers on midwifery. Ramsbotham and Rigby both employ the left hand to press against the perinæum, and the right is kept in reserve to make any necessary correction. Churchill and others adopt the same plan. Dr. Rigby admits that "it is awkward at first, because it requires the hand to be considerably twisted, and makes the wrist ache a good deal."

The left hand is twisted, in order that its fingers may be directed forwards toward the perinæum. Dr. Ramsbotham directs the palm of the left hand to be pressed against the perinæum with the fingers; I presume, the other way. He does not state so; but I draw the inference from his description: and if correct, it is liable to the objection of which Dr. Rigby is fully aware, and endeavours to avoid—that is, that the part of the hand which has the least acute sense of touch is applied to the margin of the perinæum, and you cannot so readily perceive its degree of distension as when the fingers lie close to it. The plan which I have found the most useful and convenient to adopt at this period of labour, is the following:—To sit behind the patient as she lies upon her left side, the back of the chair being towards the head of the bed, and while the head of the child is passing through the pelvic cavity, to press moderately with the left hand over the hip of the patient. Counter-pressure in this way employed is generally grateful to her, and seems to give her some relief; it assists also in keeping the pelvis fixed when the head is passing the perinæum, the most important part of this process. Having the left hand so employed, the right can be used to support the

* Rigby, p. 112.

perinæum. A single fold of a fine napkin should be placed along the edge of the perinæum, and the right hand so applied that the fold of skin between the fore-finger and thumb should correspond to this, the fore-finger and thumb passing on either side of the vulva, and the palm of the hand, resting against a thicker fold of the napkin, applied to the posterior part of the perinæum. By this means you have full power to make any counter-pressure with the palm of the hand which may be necessary, and the fingers being quite close to the edge of the perinæum and vulva, you can easily trace the margin of the perinæum, and feel the head, if necessary. Thus one hand fulfils the office generally assigned to two, and enables you to grasp with the left hand the pelvis, to prevent the patient moving away too suddenly when severer pains come on. If, the head being expelled, this be no longer necessary, you can employ the same hand to support the uterus during its contraction in expelling the body of the child. Beside these advantages, it is certainly less fatiguing. The only inconvenience of this method is, that when the funis is coiled round the neck of the child, so as to make it necessary to remove it, or that the delivery of the shoulders should be assisted, the hands must be changed, that the left may support the perinæum and the right make the required correction. But this is a temporary disadvantage and only arises occasionally. We shall suppose you, therefore, thus prepared to give the perinæum the required support; the only question is, when your assistance is needed. The young practitioner, fully impressed with the importance of preventing laceration, hardly ever commits the mistake of being too late in attending to this point. He very generally errs on the other side: he presses against the perinæum a great deal too soon, and causes unnecessary heat and irritation in consequence, which rather retards its distension. His mistake arises from supposing the perinæum in danger the moment the head touches it. We have explained to you that the head alternately touches and retreats from the perinæum, often for a long time before the perinæum suffers any dangerous distension. You must not, therefore, be too precipitate; it is better to wait until you feel the head protruding, with each pain, through the vulva, because at this time it is getting gradually upon the ischio-pubic ramus, against which it rests, while the anterior part of the head presses, with considerable force, against the perinæum. Caution

is also necessary as to the manner in which the perinæum is supported. The object in view is to obviate the effects of too violent distension. The pains at this time are very unequal, sometimes weak and again very strong; you support the perinæum against the latter by moderate counter-pressure, to prevent accidents; but against the former no such precaution is necessary: you must not, therefore, press with every pain indifferently, but only when the uterus is acting with great force. Again: when the head is nearly protruded through the vulva, anxiety to save the perinæum may be the cause of its rupture. For instance, if you attempt to draw the perinæum back over the head, it will be stretched too suddenly over the bi-parietal measurement, the widest part of the head. If, on the other hand, you push the head too much forwards, pressing with the pains from the sacrum towards the pubis, the same effect will be produced in a different manner; you force the parietal portion of the head too rapidly through the vulva. At this point it is better to continue the same moderate counter-pressure, to make no attempt to hasten the delivery, and to allow the head to pass along the hollow of the hand, in the same manner as it moved along the curve of the sacrum. When the head is passing out of the vulva, you should then direct it forwards toward the pubis; and when it is delivered, examine carefully lest *the funis may be coiled round the neck.* If such be the case, and that it is only a single coil, it will generally be sufficient to draw down a little more of the funis, and loosen it. A single coil seldom retards the delivery of the child, or arrests the fœtal circulation; but two, and even three, coils are sometimes met with, and the child placed in great danger of strangulation. In these cases, as much of the funis as possible should be brought down, and the coils so loosened that one may be drawn over the head. There are cases where this cannot be done, and the only resource left is to tie and divide the funis, and extract the child as soon as possible, in order that respiration may be established. This operation is hazardous to the child's life, and can only be viewed as the lesser of two evils.

If the funis be not found about the neck, the perinæum must still be supported until the next pain, usually a tardy one, expels the shoulders. The same caution must be exercised as before, lest the arm or hand should lacerate the perinæum as it is coming out

of the vulva. This should be particularly attended to in second positions of the head.

Sometimes the shoulders are very wide, and require to be assisted, which may be done by placing the fore finger of the right hand within the axilla of the child's arm, on the pubic side, and guarding the perinæum carefully with the left hand. As soon as the shoulders and thorax of the child are delivered, it can respire, and is, so far, beyond danger; no haste should, therefore, be used in extracting the body and lower limbs; it is preferable to allow the uterus gradually to expel them, and, while it is doing so, the left hand should be immediately applied over the fundus, in order to maintain a moderate pressure upon the uterus while it is descending towards the pelvis. This should never be neglected, because it insures a uniform contraction of the uterus, and often the expulsion of the placenta into the vagina. When the child is born, such is the anxiety to remove it as soon as possible from the mother, that the tying of the funis is the immediate occupation of the attendant, while the uterus is generally left to itself. The motives assigned by friends for this haste, is their fear lest some accident may happen to the child: it may get cold, etc. Just as often the real cause is a little natural desire to see and exhibit it: you should not, therefore, suffer yourself to be hurried by these solicitations, nor withdraw your hand from the uterus until you have secured it, either by a temporary bandage, applied in the manner we shall presently describe, or by the hand of the nurse, if she is sufficiently intelligent to understand your object. The latter plan is more convenient.

When the uterus is thus prevented from again relaxing, you may attend to the funis. The delay is serviceable to the child, because time is allowed for the transition from the placental to the pulmonic circulation, by which the latter is completely established, before placental life altogether ceases. This is of great importance to the health of the child afterwards. When this is perfectly effected, the circulation in the funis often ceases; but if its pulsations be felt, the funis may be tied if the child cry strongly. The manner of doing so is by applying a strong ligature of housewife thread, bobbin, or narrow tape, about two inches from the umbilicus, and a second about an inch further. You must be careful to see the part of the funis you are dividing, lest the fingers or any part of the child should be in your way,

and also in order to examine the cut surface of the umbilical portion. The blood should be squeezed out of the vessels, and the surface wiped with a napkin, for the purpose of detecting any oozing of hæmorrhage that might take place if the funis were not properly tied. The child may then be removed and the separation of the placenta attended to.

If the bandage have not been previously used, the hand may be again applied to the fundus uteri, which is generally found in a semi-contracted state. With a little attention, you will presently observe it become harder from contraction, although the patient scarcely complains of it. A very moderate pressure on the fundus at this time is often sufficient to expel the placenta completely out of the vagina; but if not, it can be drawn out by the funis quite easily, directing the funis forwards in the axis of the vagina. But if the uterus should not obey the stimulus at first, do not persevere; it is always more advisable to wait for some time than to use too much irritation. Neither should you attempt to remove the placenta by the funis alone. By great violence, it is true the funis may be broken, or the uterus inverted. I do not attribute to you such awkwardness; but by pulling frequently at the funis to ascertain if the placenta be separated, you may excite an irregular contraction of the uterus. Passing the fingers into the vagina is often sufficient to excite the action of the uterus; and drawing the placenta by the funis may excite it still more. If the uterus contract, and the order of its action be not secured by the means already pointed out to you, the great probability is that, being nearly emptied of its contents, the lower fibres will contract first, and retain the placenta. Thus, by pulling too much at the funis, the placenta may be retained. By a little caution, and by moderate pressure on the fundus of the uterus, you will generally secure its favourable separation. This being accomplished, the next and concluding object of your attention is to preserve the uterus in that state of contraction which is so necessary to prevent subsequent hæmorrhage. We have already explained to you the efficiency of the abdominal muscles, when they are strong enough to contract firmly upon the retiring uterus. But when these muscles are rendered inert from the constant distension they are exposed to, they can give the uterus no support, and there is, consequently, a constant risk that the uterus may again relax and pour out blood, if this want be not

supplied by artificial means. Hence the use of the abdominal bandage. The mode of applying it demands your attention; because it may be made useful or mischievous according to the manner it is employed, and many of the objections raised against its use have been founded upon its improper application. Sometimes it is bound so tightly over the uterus, that the patient can hardly breathe, or it may be so applied that the least motion of the patient displaces it, and it becomes twisted round the loins like a rope. All these inconveniences, distressing to the patient and useless for the intended purpose, arise from a mistaken view of the use it is meant to fulfil. The waist is to be compressed into shape, and therefore the patient is bound up so tightly that she can seldom tolerate the pain of the bandage: it is soon loosened, and perhaps altogether discarded. A bandage properly applied may be made to effect two objects; one, to support the pelvis by compressing it as much as possible; another, to support the uterus by *moderate* and *equable* pressure over the whole abdomen. The articulations of the pelvis have undergone a great degree of tension during the passage of the head, and a dull pain sometimes remains, which is much relieved by counter pressure. The uniform pressure of the intestines is necessary to prevent relaxation of the uterus. The mode of applying the bandage for these purposes is to commence by drawing it evenly over the pelvis, its lower edge, when so placed, being about one inch below the trochanter; this margin should be drawn as tightly as the patient will bear, and pinned securely below the right trochanter. The bandage should be again drawn and pinned in a similar manner across the ilia, so that the pelvis may be embraced by this portion of the bandage, about three inches in width, as tightly as possible. Having accomplished this, the remainder of the bandage should be drawn and pinned with moderate tightness, but equally from the pelvis to the diaphragm, so that the whole of the abdomen be included within it, and not permitted to project over the bandage in the unsightly manner which may sometimes be observed.

When the bandage is properly applied, the patient always experiences comfort from it, a sufficient evidence of its utility. There is a great variety in the material employed for bandages. Sometimes a piece of calico or a napkin is used; and, again, you will find them more complicated in their mechanism than the

most fashionable corset—both are equally inefficient. Calico and diaper are too unyielding, and if pinned tightly, will hurt the patient; nor can they be employed unless they are so loose as to be useless. *The obstetric corsets*, if we might so call them, for drawing in the waist, are liable to all the objections which have been urged against bandages. It is necessary that a bandage should be elastic, that while it supports the abdomen it may yield readily to its action; it should be sufficiently thick or firm not to wrinkle easily, should be soft in its texture, and at the same time strong enough to bear being tightly drawn. A double fold of flannel would answer the purpose, and has the advantage of being easily pinned; but if you remember the intention the bandage is to fulfil, your own judgment will best direct you to the kind of material which will suit your object. From what we have stated, you will perceive that a bandage may be made useful or injurious, according to the manner in which it is applied. You should not, therefore, entrust this simple but important part of your duties to another. It is sometimes a practice to commit to the nurse its application: it would be imprudent for you to do so in the first instance, or so long as there is any risk of hæmorrhage, from relaxation of the uterus; it will be sufficient time to leave its management to her when your patient is secured from danger. If ordinary discretion be used, it may be applied without offending the feelings of the most sensitive person, and therefore no motive of false delicacy should prevent the practitioner fulfilling this essential duty. When the bandage is applied, the folded sheet, etc. that had been placed under your patient during labour should be removed, and replaced by others dry and warm, in order that she may be induced to sleep, and that she may not afterwards be disturbed. It is the more necessary to attend to this, because it too frequently has happened that hæmorrhage has been induced by imprudence on the part of the nurse, who, when the attendant has left his patient, immediately sets about making her "dry and comfortable," and in doing so, causes so much excitement in the process of dressing her, and changing the bed-clothes, that hæmorrhage is the result. The patient, after her delivery, always experiences a nervous shock, often very slight, but still sufficiently obvious. Although happy in her relief from suffering, and in the birth of her offspring, she still feels depressed; and this period, beyond all others, is that in which perfect repose is absolutely

necessary. Too much caution cannot, therefore, be exercised to prevent her being disturbed. Having secured to your patient perfect quietness and freedom from interruption, your immediate duties are completed; but still caution is necessary, and although you should retire from the apartment, it would not be advisable to leave the house for at least an hour after her delivery, or until she falls into a sound sleep.

It sometimes happens that the placenta is retained after delivery, without any hæmorrhage taking place; and although we shall have again to direct your attention to these retentions, when accompanied by flooding, a few words may not be out of place here, in reference to these very frequent retentions, where no hæmorrhage arises. The causes generally assigned for retained placenta are, either *inertia* of the uterus, *hour-glass contraction*, or *adhesion;* but one quite as frequent, if not more so, is *suspended action* of the uterus. The former causes are generally attended by hæmorrhage, but with the latter it is very seldom the case. The placenta is retained merely because the uterus is deprived of the necessary irritation to cause its efficient contraction. In such instances, the first contractions of the uterus not being supported, the organ becomes, as it were, accustomed to the presence of the placenta; and it remains imperfectly contracted about it, without any further effort at expulsion. In this way, the placenta may remain two—four—six hours in the uterus without being expelled. If the rule which we have laid down be observed, and a steady but moderate pressure be maintained upon the fundus of the uterus during its contraction, this will seldom happen; but if the placenta be not separated then, it is better to wait for some time,—from half an hour to an hour,—and again to excite the uterus to contraction. For this purpose, the fundus should be brought, as nearly as possible, towards the centre of the pelvis, and grasped firmly with both hands; as soon as it becomes hard, strong pressure upon it is generally sufficient to cause the expulsion of the placenta; if it should not, do not use any violence; rather let the nurse, under your direction, maintain the fundus in the same position, while you pass the fingers, and, if necessary, the hand, into the vagina, in order to stimulate the uterus to contraction. For this purpose the funis should be held firmly in the left hand, and the fingers of the right hand passed along it within the vagina. Sometimes this alone excites contraction; but if not,

all the fingers, in a conical form, may be introduced within it as far as the os uteri: in doing so you will often find a large portion of the placenta lying at the upper part of the vagina; you may even feel the insertion of the funis, but do not attempt to withdraw it, pass the hand still toward the os uteri, and by irritating it, the portion of the placenta that lies within the cervix is often detached, so that the whole placenta may be removed. If this be not sufficient, withdrawing the hand along the vagina for a short distance will excite contraction; but if both means fail, the fingers must be introduced in the same manner within the os uteri, to dilate it, when the upper part of the placenta may be grasped, and the whole removed. The assistant should press firmly on the fundus uteri while the hand is being withdrawn. In many instances the placenta is found in the upper part of the vagina alone, and can be very easily removed; but no attempt of this kind should be made until the hand has passed above it, so as to have it completely within its grasp. When efforts are made to draw the placenta away by the lower portion, there is always a risk that it may be broken in the attempt, especially if it be caught by the cervix uteri. In one instance which came under our notice, a small portion of the placenta was adherent to the neck of the uterus, and the remainder being dragged away in this manner gave rise to hæmorrhage that terminated fatally.

Another cause of retention of the placenta without hæmorrhage, is irregular contraction of the uterus. This is excited, as we have stated, by drawing the funis frequently, for the purpose of ascertaining whether the placenta is separated. Sometimes, also, it is produced by frictions over the anterior wall of the uterus, or rather, over the corresponding portion of the abdomen. By this manipulation, the uterus is often pushed over to the iliac fossa, where it remains in a semi-contracted state; or the anterior portion of the uterus is contracted, while the posterior, where the placenta is commonly attached, is relaxed. To remove this irregularity it is necessary, not only to grasp the fundus firmly, as before mentioned, but to pass the fingers over the posterior wall, as low as the abdominal parieties will admit, when, if the irritation excite the relaxed portion, the order of uterine contraction is instantly restored, and the placenta will be immediately expelled. In these cases of retention, it is seldom necessary to wait longer than an hour to have it removed; and if the uterus be carefully attended

to during its contraction, and firm pressure afterwards used, if necessary, you will very seldom have any occasion to wait so long, or to pass the hand into the uterus to withdraw the placenta.

With these observations, we shall conclude the management of natural labour, and consider the further treatment of the parturient woman after her delivery in a future part of the course, when we enter upon the subject of lactation.

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LECTURE VII.

DIFFICULT LABOURS.

Difficult Labours divided into Tedious and Laborious Labours—Causes of Tedious Labours—Over-Distension of the Uterus—Extreme Obliquity—Gradual Escape of Liquor Amnii—Hysterical Excitement—Mental Despondency—Rigidity of Os Uteri from Inflammation—Toughness of Os Uteri—Extreme Rigidity, etc.

THE first exception to the definition which Denman has given of natural labour is that in which labour exceeds twenty-four hours. It then becomes *difficult labour*, and to this subject we would now direct your attention. According to this definition, when the vertex presents, and no accident occurs, time alone would seem to be the criterion which is to determine the class to which labour is to be referred: but this is not the case, and you must understand this definition to be only of general, not universal application; that while, on the one side, there are cases in which labour is so severe, and the obstruction so great, as to render it difficult, nay, even dangerous, before twenty-four hours expire, there are also instances, on the opposite side, in which labour may be prolonged far beyond the prescribed period, and yet present no difficulty to the practitioner, but the difficulty of sustaining his patience. There are many circumstances, therefore, besides *time*, which should be considered, in reference to difficult labour, and you must only accept the definition we have given you as one which will embrace a larger number of such cases than any other that we might propose.

The causes which render labours difficult vary exceedingly. The delay arises sometimes in the first, sometimes in the second stage. In one instance, the constitution of the patient, or the rigidity of the passages, may retard the delivery; in another, the disproportion between the head of the child and the pelvis may impede the progress of labour. It is necessary, therefore, to

classify these causes, and for this purpose we would include, under the head of "*difficult labours*," two subdivisions—1st, That in which labour is merely prolonged beyond the average period, without being, at any time, unusually severe,—it is then called "*tedious labour*,"—2ndly, That in which, without reference to time, there is a powerful struggle carried on by the uterus to overcome some unusual resistance. This may be called by the expressive term "*laborious labour*." The causes which produce the former are most frequently met with in the first stage of labour; those that give rise to the latter, generally occur in the second. These divisions embrace a great variety of causes, which may be classed under several heads. Tedious labour may depend either upon inefficient action of the uterus, or rigidity of the passages; and as their consideration will form the subject of the present lecture, we place these causes before you in a tabular form, in the order in which we shall consider them.

Inefficient action of the uterus from—

1. Over-distension of the uterus.
2. Extreme obliquity of the uterus.
3. Gradual escape of the liquor amnii.
4. Hysterical excitement.
5. Mental despondency.

Rigidity of the passages—

1. Rigid os and cervix uteri.
2. Contracted vagina.
3. Rigid perinæum.

Such are the usual causes of tediousness in labour. We might add others which are less frequently met with; but it is unnecessary to propose to you a complicated classification. The first of these conditions, then, is:—

1. *Over-distension of the uterus.*—This cause of delay is not very commonly met with; but when it occurs and prolongs labour, the uterus is so immensely distended by the liquor amnii, that, like the bladder in retention of urine, it is for a time paralyzed. The accumulation of fluid arises from a diseased condition of the amnion, which is often thickened and marked with broad patches of a white colour, as if lymph had been effused between it and the chorion. This thickening of the membranes and dropsy of the amnion generally accompany each other; but the delay in labour principally depends upon the latter cause.

When the uterus is thus over-distended, the grinding pains, which last only for a moment, return with longer intervals between them, and sometimes they cease altogether; so that if the

cause be unknown, the patient may remain for an indefinite time teased by these inefficient spasms of the uterus, or labour may be quite suspended. Very little attention, however, is sufficient to detect this condition of the membranes. In such cases, the child is generally small, and the evidence, through the abdomen, of its presence in the uterus, is not so manifest. The fœtal heart often cannot be heard, the placental murmur is indistinct, or may be absent; at the same time, the abdomen is greatly distended, and the sense of fluctuation over its surface general. When the vagina is examined, no presentation can be felt, the membranes, tensely distended by the liquor amnii, alone protrude through the os uteri. Such evidences are sufficient to determine the cause of delay, and as the dilatation of the os uteri has generally made some progress with these tardy and feeble pains before the case can be considered tedious, the liquor amnii may be discharged without much risk of the os uteri becoming irritated; nevertheless, caution is necessary in this simple operation, because if the liquor amnii be discharged suddenly, the violent gush of the fluid may derange the position of the child, or bring down the funis into the vagina. The safer plan would be to puncture the membranes within the os uteri as high as you can reach, so that the liquor amnii may escape gradually. When the uterus is thus relieved, the pains increase in strength and frequency, so that labour generally proceeds rapidly to its conclusion.

2. *Extreme obliquity of the uterus* is the next cause of delay. This obliquity may be either lateral or anterior. When the obliquity is lateral, the uterus is generally inclined to the left side of the abdomen in place of taking its more usual direction to the right side: it rests very much upon the iliac fossa, and the pains, which may be strong, have little effect upon the os uteri, although quite dilatable; this circumstance will excite a suspicion of the cause, but an examination of the uterus through the abdomen will at once determine it.

Mere change of position is sometimes sufficient to remove this difficulty. Those pains which had been short and irregular, and consequently ineffectual, while the patient lay on her left side, become steady and efficient when the patient changes to the right side. The dilatation of the mouth of the uterus proceeds rapidly to its completion, and the labour, that had been lingering for hours before, is often terminated by a a few strong pains. If this

mode be not sufficient for the purpse, a broad bandage may be applied round the abdomen, and drawn towards the right side as firmly as the patient can conveniently bear.

When the uterus is inclined very much forwards, it may arise either from the pelvis being so shaped that the axis of the brim is nearly horizontal, or from weakness of the abdominal parieties; possibly from both combined. In these instances, the uterus is sometimes so completely displaced, that the direction of the fundus is reversed, and the uterus hangs down over the pubis so as to rest upon the thighs. Labour is, of course, impeded; but if the bandage be so applied as to draw the uterus gradually upwards, or even if it be supported by the hand during its contractions, labour will often advance rapidly to a favourable termination.

It is advisable to allow the patient to lie more upon her back than her side, but as there is a great difference in the position which different women find most favourable to their pains under these circumstances, you will sometimes meet with cases where they lie, not only on their side, but with the body completely across the bed. This difference may depend upon the cause of the obliquity: if it arise from weakness of the parieties of the abdomen, to lie on the back would be the most likely position to correct this deviation; if it depend upon a horizontal aspect of the pelvis, the body would be inclined forwards, to lessen its distance from the axis of the uterus. It would be unsafe, however, to theorize too much on such a subject; and happily it is the less necessary, because nature generally prompts the woman to adopt the position which is the most favourable for her. You should not insist, therefore, too much on any given position, but rather let your patient try different postures, and accommodate yourself to that which she feels to be the easiest. The mouth of the uterus is often greatly displaced in these cases: it is directed very much towards the promontory of the sacrum; and hence, in order to correct the obliquity, some have advised that the forefinger be passed within the opening, and the os uteri drawn towards the centre of the pelvis. How is it possible to alter the pendulous fundus by such means? But if, in order to correct the position of the fundus, it is also necessary that it be raised by the opposite hand, the introduction of the finger is not required, because then the mouth of the uterus will correct itself. Such means, therefore, should be

avoided, because they are calculated to excite irritation. Some serious mistakes, however, may be made, as to the cause of delay, when the os uteri is absent from its usual situation. For instance —when the anterior lip has become so thin as to resemble the membranes, it may be mistaken for them, and this extreme tenuity sometimes takes place when the anterior lip becomes the most dependent part of the uterine tumour. The delay might easily be attributed to rigidity of the membranes, and the supposed membranes—that is, the uterus—accordingly punctured. Another error is, the supposition that the os uteri is either closed by a cicatrix, or is imperforate. A mistake of this kind has led to the sagacious operation of dividing the cervix to make an artificial os uteri: such an instance has been mentioned by Dewees.* You should, therefore, always make the most careful vaginal examination, and you will seldom fail in finding the os uteri (often not larger than a sixpence) directed upwards towards the promontory of the sacrum.

3. *The gradual escape of the liquor amnii* also gives rise to tediousness. If this take place when the os uteri is slightly dilated, in other words, when the latter is so long exposed to the pressure of the head of the child as to become irritated by it, the result is rigidity of the os uteri, and its consideration falls naturally under that head. But if the os uteri be dilated to any extent, and not easily excited by irritation, this accident may have an opposite effect, and hasten rather than retard delivery.

We would now direct your attention to much more important causes of delay—viz., those which depend upon the temperament of the patient: such as are produced by high mental excitement, or by its opposite, great depression of mind, acting through the constitution on the uterus.

4. *Hysterical excitement* is the first of these causes to which we shall allude. Hysteria is one of the most frequent affections of the female constitution. In the course of your practice, you will meet with many instances of that highly-excitable temperament which is associated with this disease. When these hysterical females become pregnant, and the period of parturition arrives, the practitioner has often to undertake the management of a case

* Dewees' Midwifery, p. 90.

far more embarrassing than those in which mechanical impediments obstruct delivery.

As the time of her trial approaches, the patient becomes anxious and excited; she has perpetually before her mind this long-looked-for event; her attention is constantly alive to the most trifling circumstance that has reference to the suffering she has to undergo. Consequently, when at length the moment arrives, her mental excitement is strained to the highest pitch; labour has scarcely commenced when it is suspended by her anxiety, and is again renewed only to be again interrupted in a similar manner. Proceeding in this irregular course, the first stage of labour may be prolonged considerably beyond the time it would otherwise occupy; and when this is the case, the patient (who from the beginning was not very tolerant of her suffering), being taken as it were by surprise, and never anticipating such delay, becomes still more anxious. She may possibly be alarmed for her safety; and then her mental inquietude bursts through all restraints: she begs urgently to be released from her agony; and if you hesitate to comply with a request to which you dare not accede, she loses all confidence in you; her impatience knows no bounds, every pain is interrupted by the most violent exclamations, and sometimes terminates in a fit of hysterical convulsions. Such a case, therefore, requires the most careful attention, not only in its medical treatment, but in the circumspection that is necessary in its management. Conversation should not be permitted within the hearing of the patient; none but her immediate friend and the nurse should be allowed to remain in the room; and while you use every exertion to give her encouragement, and, if possible, to lessen her excitement, you must not commit yourself by hasty promises. With regard to medical treatment, your chief attention should be directed to the state of the bowels. If it be in your power to enter upon a course of treatment before labour has commenced, your chances of success will be greatly increased. In many of these cases, there is great constipation previous to parturition; but in all, the evacuations are of an unhealthy character, dark, viscid, scanty, and offensive. A preliminary course of alteratives, combined with stimulating aperients, will correct this condition, and lessen the hysteric influence; but if you are not given the opportunity for such treatment, and are for the first time called upon to take charge of the case when labour has actually commenced, it would be advisable to have an assafœtida

enema given before labour has made any progress. Scybalæ lodge frequently in the rectum and large intestines, causing great irritation, which contributes to impede the action of the uterus. When the bowels are unloaded, narcotics, combined with the diffusible stimulants, will more efficiently control the irritability of the patient. Women of this temperament are often greatly fatigued by their own useless and impatient efforts to hasten their delivery, as well as by the length to which labour may be prolonged. In such instances, a full anodyne frequently procures some hours' refreshing sleep; after which the pains become more regular and active. If you should find that, notwithstanding such treatment, the action of the uterus is still weak and inefficient, ergot of rye may be given in moderate doses to excite it; but its use should follow the treatment previously mentioned, and only when the uterus continues to act feebly, although the nervous irritability of the patient has been tranquillized. A judicious application of these adjuvants will aid you in exciting regular and dilating pains, and will bring this stage to a favourable conclusion. If the first stage be not so much prolonged as to exhaust the patient, the second will generally terminate without much difficulty: these hysterical symptoms often disappear when the expulsive efforts of the uterus absorb the attention of the patient. Cases of this description are embarrassing to the practitioner from their tediousness, but seldom terminate unfavourably if they are properly treated. The same remark does not apply to the next cause of delay.

5. *Mental despondency.*—This source of difficulty is but briefly alluded to by the majority of obstetric authors. "Depressing passions of the mind" are enumerated among the causes that retard labour, but are not dwelt upon in proportion to their importance. Fortunately, extreme cases of this kind are rarely met with; but instances might be quoted in which death was the result of such a cause. Cases are occasionally recorded of *unaccountable sudden death* after labour, which might perhaps be explained in this way, if all the circumstances of the case were understood; at least, the few instances that have fallen under my notice seemed to admit of such an interpretation. In one case, death would undoubtedly have taken place, had not the cause of depression been so obvious.

A poor emaciated woman entered the Dublin Lying-in Hospital,

January, 1834, to be delivered of her eighth child. "Sharp misery had worn her to the bones;" her pulse was feeble, the action of the uterus weak: notwithstanding this, she was delivered in an hour after admission; no hæmorrhage took place, and the placenta was separated without any difficulty; but her delivery was followed by the most alarming depression, which required the utmost care and attention to prevent her sinking altogether. Fortunately, strong beef-tea and other nutritious diet had been given to her from the time of admission, so that, with the addition of stimulants and maintaining the temperature of the surface, she gradually recovered. This was a case where poverty and starvation produced their usual effects, and consequently one more under the control of treatment than those melancholy instances, in which some cause operating on the mind alone produces some extreme nervous shock which we cannot relieve, because we cannot "minister unto a mind diseased." An instance of this kind occurred in the same institution the following year, January, 1835. A young woman was admitted in labour of her first child. She was evidently above the class of persons usually admitted into that establishment. She seemed rather to shun observation; and there were no symptoms attending labour that required interference. It proceeded to its conclusion without any interruption, and terminated within ten hours from its commencement. The pains were feeble, but they were sufficiently strong for the purpose: the patient herself appeared also weak. She was delivered of a girl; and in about half an hour after, the placenta was expelled; but the pulse instantly sunk, syncope followed, and every means that could be used failed to prevent dissolution, although the discharge from the uterus was not increased, nor was there the least evidence of hæmorrhage, either externally or internally.

An inspection was made twelve hours after death, and no cause could be discovered to explain an event so unlooked for: her history, however, may do so. She had been one of a respectable family, delicately reared, and educated in the strictest moral principles. She had been seduced, betrayed, and deserted; and, to complete her miseries, had to endure her hour of trial in the reception-ward of the Dublin Lying-in Hospital. I shall only mention another instance of this kind, which will, perhaps, more distinctly illustrate the effect of extreme nervous shock.

In the beginning of the year 1834, a poor woman had walked some distance to the Dublin Lying-in Hospital, and when near it, was suddenly seized with the pains of labour. She was delivered in the street, and with much difficulty brought into the house before the placenta separated. It came away, however, without difficulty; and the trifling hæmorrhage that followed was easily arrested. Her alarm was very great, but after some time it subsided: she slept, and nothing further occurred out of the usual course until the following day. On that morning a patient was brought into the same ward to be delivered, who was extremely boisterous: she occupied the next bed to this woman, who lay so quietly that she seemed to pay little attention to the disturbance. In the course of the day, however, she complained of being overcome by her cries. She felt faint, as if she were sinking; she had slight pains in the epigastrium, some sickness of stomach, pulse rather rapid, compressible, and soft. The woman who caused this was fortunately delivered, and thus all further annoyance was removed; but this patient did not recover from the effect that it seemed to produce on her. Stimulants were given to her, the extremities and surface kept warm, and the most perfect quietness observed in the ward, but all to no purpose. In the evening she was seized with syncope, so alarming as to excite the greatest apprehension for her safety: the extremities became cold, her motions passed involuntarily, and she died in about three hours. The uterus was perfectly contracted; there was not the slightest appearance of hæmorrhage from the vagina, nor any symptom present to explain the cause of dissolution.

A very careful inspection was made after death: all the viscera of the abdomen were quite healthy; the uterus firm, and contracted to its usual size. There were some old adhesions in the lungs; the heart was small, and contained very little blood on the right side; the vessels were all sound; and the only alteration in the brain was an increased quantity of serum in the ventricles and at the base. No other explanation therefore was left, but the probable one, that she sunk in consequence of extreme nervous shock. Her own sudden delivery produced a strong impression on her mind, in the first instance. This was again excited and increased by the violence of the patient alluded to, and hence the effect. It is probable that she would have recovered from the first shock, had it not been again renewed by this accident.

These instances will illustrate the influence of the mind on the constitution at this critical period: they are fortunately rare, but those cases where the same cause operates in retarding, and sometimes in suspending, the action of the uterus, are more frequently met with. The sympathy (to use a popular term) that exists between the brain and the uterus is matter of daily observation, the change of feelings and temper that frequently result from pregnancy, the hallucinations that occur after delivery, from the slightest temporary aberration to long-continued mania, all prove the influence of the uterus on the mind. So, on the other hand, a disturbed mind suspends the action of the uterus, just in the same manner as it interferes with the healthy action of the digestive organs. As in the latter class of cases you find the appetite gone, the digestion imperfect, the liver disordered, and the bowels constipated, so in the former, parturition may be greatly prolonged, and the patient recovered with difficulty from the effect of a labour that otherwise would have been happily concluded within the average period. Such cases may come under your notice: it is therefore necessary to recollect their characters.

They differ altogether from the former class of patients; there is no restless excitement about them; on the contrary, they submit to their suffering with a quiet resignation, which might be called fortitude, only that the feeble pulse and listless expression pronounce it the indifference of despair. The patient meets her trial without hope, with the settled conviction that she will not escape. The sufferings that attend the birth of her offspring are only lighter pangs added to the accumulation of sorrows that have already overwhelmed her; she therefore makes no complaint, no inquiry; but the pains are feeble, the dilatation of the os uteri is consequently slow, and the labour protracted. The uterus is evidently unequal to the required effort.

You have no clue to unravel the intricacy of these symptoms, as you are, of course, never informed of their cause. Nevertheless, the quick and feeble pulse may excite your suspicions; the tendency to chill and the coldness of the extremities will increase them, and the constant, although passive, watchfulness of your patient, will confirm your apprehensions.

The moment you perceive the nature of the case, no time can be lost. A treatment is required the opposite to that generally

employed. Stimulants may be given moderately, carefully observing their effect, the temperature of the surface and extremities attended to, and the bowels (which are always constipated) relieved by warm and stimulating enemata. Ergot of rye, in moderate doses, to excite the specific action of the uterus, is useful.

You may thus succeed in securing a favourable dilatation of the uterus, before the patient becomes exhausted; so that, in the second stage, the uterus may retain sufficient power to complete the delivery in a short time; but if this be not the case, artificial assistance becomes necessary, in order to abbreviate its duration as much as possible. When the child is partly born, you must be careful, also, not to withdraw it too rapidly from the vagina and uterus, because the danger that attends the case is not confined to the effect of tediousness in labour; you have still to guard against the syncope that may follow the complete contraction of the uterus. It should, therefore, be permitted to expel the remainder of the child very gradually, while an equable pressure is maintained by a broad bandage over the abdomen.

The Second Division of causes that render labour tedious, is, *rigidity of the passages.* This may exist either in the cervix uteri, vagina, or perinæum. At present we shall confine our attention to rigidity in the cervix uteri. In a former lecture, we took occasion to point out to you, that under the term "rigidity" were included different states of the os and cervix uteri, presenting different degrees of resistance. We shall first speak of those cases where *the rigidity has been induced* by some accidental cause, and secondly, consider *idiopathic rigidity.*

If the os uteri be much exposed to irritation, it is rendered rigid; the lips become swollen, hot, and tender: when these signs of commencing inflammation present themselves, the cervix is less disposed to yield to the action of the uterus, and becomes rigid. One of the most frequent causes of this kind of rigidity is the *gradual escape of the liquor amnii*, by which the head of the child descends upon and irritates the cervix. If this irritation be long continued, you have to contend, not only against the effect of inflammation, but also against a spasmodic contraction of the circular fibres of the body round the child. When this happens, an additional resistance is offered to the action of the fundus. In the treatment of it, therefore, promptitude is necessary. If the

patient be strong, plethoric, and disposed to make violent straining efforts, a free depletion from the arm will be of much use; it diminishes the tendency to inflammation, and produces a feeling of exhaustion in the patient, which induces her to bear her pains more patiently. In order to ensure such an effect, depletion may be followed by tartarized antimony, in small doses, so as to excite nausea. Women who may have been previously very violent and intolerant of their pains, are soon subdued when the sense of exhaustion that attends sickness is excited. If, on the contrary, your patient be of an opposite temperament, this treatment cannot be employed; local depletion is preferable; a dozen leeches may be easily applied to the cervix uteri; warm emollient enemata may be given, and if the woman be much fatigued, or if the pains become feeble and irregular, an anodyne is often very beneficial; some sleep is procured, the irritation of the cervix is diminished, the spasmodic contraction of the fibres disappears, and the pains return with more regularity and strength.

Another cause that renders the cervix uteri rigid, from a tendency to inflammation, is its accidental compression by the head against the pelvis. Sometimes the mouth of the uterus, partially dilated, is driven down with the head into the pelvic cavity, where it is sometimes tightly wedged between the head and the pelvis. Cases are recorded in which the whole cervix uteri has been completely separated by a circular slough, and expelled with the head. In order to avoid this, it is necessary to use every means to combat inflammation, and to prevent, as far as possible, the effects of extreme pressure. Local depletion, either by leeches or by scarification, may be employed with advantage, and when the pains cease, the head should be pressed back towards the brim, to relieve the constriction of the cervix uteri. This plan of treatment, with warm emollient enemata, which act as fomentations, will generally succeed; but if the impaction be so great as to render it impracticable, instrumental aid becomes necessary. The consideration of this we must defer to another opportunity.

Again: the cervix and os uteri may suffer only a partial constriction, and thus become inflamed, and retard delivery. The head of the child may rest on the pubic side of the pelvis in such a manner as to compress the anterior lip of the uterus, and prevent its dilatation. A band is thus formed before the head, which when long pressed upon, is swollen, tender, and rigid. The

treatment of the cervix when in this state has become a kind of *vexata questio* in obstetric practice. Some practitioners of station and experience have advised that the anterior lip of the os uteri be pushed up by the fingers, above the head, in the interval of the pain, and there maintained until the returning contraction of the uterus drive the head below it; while others of equal reputation deem such practice to be objectionable, and calculated rather to increase than to diminish the difficulty, by exciting more inflammation. I may mention the late Dr. Hamilton, of Edinburgh, as holding the former opinion; Dr. Collins, of Dublin, the latter; as a proof how men of very extensive experience often arrive at opposite conclusions on what would seem to be a simple practical point. It is my duty neither to draw you into controversy nor to give you too dogmatic an opinion on a question so nicely balanced by authority. I must assume, on the evidence of Drs. Hamilton, Burns, and Breen, that this kind of artificial dilatation may be accomplished in some instances with safety and success. My own experience, however, confirms that of Dr. Collins, and is opposed to this practice: the opportunities I have had of putting it to the test have taught me that success is by no means so easy as it is described to be; that the anterior lip may be pressed back again and again, and yet return to the same situation as before; that it is difficult to get the head to pass the introduced finger; and that these attempts, when unsuccessful, only increase the swelling and inflammation of the soft parts. I have also met with instances, in which, after a failure of this kind, the anterior lip was retracted without any assistance, when the contractions of the uterus succeeded in at length altering the direction of the head. It appears to me, therefore, that this kind of manipulation may be employed, and would be serviceable if the fingers were placed against the head of the child, in order to relieve the constriction of the anterior lip, and to direct the head more towards the pelvic cavity. I am still, however, disposed to object to the practice of artificial dilatation of the mouth of the uterus for the former purpose. While on this part of our subject, I must apprize you of a deception which may be produced by certain states of the os uteri. The anterior lip is sometimes hypertrophied, and projects so much before the head that it seems to be the cause of difficulty. It is scarcely necessary to say, that you will employ your time very fruitlessly if

you attempt to push back this hypertrophied portion of the os uteri.

That resisting condition of the cervix uteri, to which we have applied the term "*toughness*" (an expression borrowed from Dr. Hamilton), is often met with. The os uteri forms a thick gristly ring, rather dry, and without tenderness. It yields very slowly to the repeated efforts of the uterus, and hence this stage is generally very much prolonged; but so long as inflammation is not excited, no injury is caused by the time occupied in dilatation; nay, more, these cases often recover more rapidly than where the labour is short, although severe. The treatment is altogether of a negative character; rather to watch its progress attentively than officiously to attempt to hasten it. Every care should be taken to prevent inflammation taking place; and vaginal examinations should be made as seldom as possible. The patient should not be suffered to fatigue herself by endeavouring to assist the pains, and by fruitless efforts to shorten her sufferings. The room should be kept perfectly cool; and, as there is generally very great thirst, heating drinks should be strictly forbidden: warm emollient enemata may be given with advantage; and if a stimulus be required to excite the action of the uterus, the addition of common salt in a moderate dose will generally answer the purpose. In such a case as this the first stage may occupy thirty, forty, fifty hours without injury, but if attempts be made to hurry it to a completion, either by mechanical dilatation or by ergot of rye, they will only cause what you are, or should be, always anxious to avoid—inflammation. The former is a direct, the latter, an indirect irritant, because, when the uterus is much excited to contract, by the specific action of the medicine, the membranes are broken prematurely and the head driven forcibly down upon the undilated os uteri: thus your difficulties are rather increased.

The patient may become fatigued and dispirited by the continuance of this stage, and the pains feeble and inefficient. When such is the case, a full dose of opium is often very serviceable; and the nearer the time of natural rest at which it is given, the more likely it is to succeed. A woman who has been fatigued by constant pain during the day, will often sleep the greater part of the night after an anodyne, and awake quite refreshed by

her sleep. The dilatation of the os uteri then proceeds more rapidly to a favourable conclusion. Time, in fact, is the only remedy for this condition of the passages.

The last kind of rigidity to which I shall have to allude is that in which *the os uteri is like cartilage*, and will not yield to the most powerful and constant action of the uterus; the membranes are usually broken and the waters discharged early in this stage, and therefore the uterine action is increased to its full extent. Inflammation is the almost certain consequence of the struggle that ensues; you have, therefore, complications of the worst description to contend against. The issue of a case of this kind is the spasmodic and irregular contraction of the uterus about the body of the child, and frequently its death, before the uterus is opened to any extent. It therefore becomes a case for delivery by perforation. But there are some instances in which the dilatation is brought to a successful termination by extreme care in the management of the case. As a preliminary treatment, the frequent use of the warm bath, although an exception to ordinary rules, is found to be very beneficial. When labour begins, warm emollient enemata should be givan from time to time, and the patient placed at once under the influence of tartarized antimony. General depletion may be employed if the patient be robust; if otherwise, local depletion is preferable, and it is indicated as soon as the least tenderness of the os uteri is observed.

If these means fail, it becomes a question whether we should wait for the death of the child, in order to remove it by the crotchet, or incise the unyielding cervix. The former practice involves a sacrifice of life, but generally secures the mother from the injurious effects which may follow The latter may be the means of preserving the child, but if the incision lead to a laceration of the uterus, the mother is at once placed in the most imminent danger of her life. The fear of such a consequence, it appears to me, has prevented any attempt being made thus to cut through this Gordian knot of difficult labour in its first stage, but whether this, like other operations, is only surrounded by chimeras of the imagination, which some bold spirit will dissipate, remains yet to be proved. Incision has been performed without accident; the same may happen again,

and I confess, in a case such as I have described to you, I should be more disposed to adopt the shorter course, in the hope of saving the child, than to wait until its death enabled me to remove it. This, however, is but an individual opinion, and needs support.

LECTURE VIII.

LABORIOUS LABOURS.

Causes of Delay in the Second Stage of Labour: Head of the Child misplaced—Too large, and too much Ossified—Hydrocephalic—Pelvis like the Male Pelvis—Deformed—The Ovate Pelvis—The Cordiform Pelvis—Head of the Child above the Brim of the Pelvis—Fixed in the Brim—Arrested in the Cavity—Characters of Arrest and Impaction of the Head.

THE causes of delay in the first stage of labour have been detailed to you in the preceding lecture; those which occur in the second stage we have now to consider. The former gives rise to labours that are called "*tedious;*" the latter, to those that are termed "*laborious*," in consequence of the extreme severity of the struggle that ensues in the effort to force the head through the pelvis. Difficulties in the second stage of labour are produced either by disproportion between the head and the pelvis, or by some mechanical impediment obstructing the head in a pelvis that otherwise would permit it to pass. In cases of disproportion, the cause may exist either in the head of the child or in the pelvis, or in both combined.

We shall therefore direct your attention to each separately—1st. To the head of the child as a cause of delay; 2nd. To disproportion in the pelvis; and having considered the management of, and rules of practice applicable to, cases of this description, we shall then briefly conclude with some observations on those mechanical obstructions that are sometimes met with.

1st. *The head of the child* may be a cause of difficulty from *its irregular position.* It may be *too large*, or *too much ossified*, or it may be *hydrocephalic.*

We have already sufficiently dwelt upon the positions of the head; very few observations upon them as causes of delay in labour will now be necessary. Some of these positions, as face and face-to-pubis presentations, have been assumed as, rather than proved to be, causes of difficulty. We have shown you that the majority of these cases terminate within the ordinary period.

Nevertheless, there are some exceptions in which labour is prolonged, and in which danger may arise if a judicious treatment be not adopted.

When the head is arrested with *the face towards the pubis*, you will have no difficulty in detecting the position by the rule we have laid down; neither, when it ceases to advance, is it hard to correct. Sometimes the correction may be made with fingers, but it is preferable to introduce the vectis on the pubic side of the pelvis, to press the head back in the intervals of the pains, and to rotate it gradually towards the sacral side. When I say "gradually," I mean that you should rather trust to frequently repeated efforts to give the head its proper direction, than to make a violent attempt to change the position in the first instance. The adoption of such a course would only end in disappointment, and complicate your difficulties. It is obvious that in these cases the head should not be suffered to remain too long arrested, because it may be impossible then to alter it, and you will be compelled to extract the child with the forceps—an operation which, in such a case, would be one of no little difficulty —dangerous to the soft parts of the mother, especially to the perinæum.

If *the face-presentation* be in a similar manner arrested, as few vaginal examinations as possible should be made, merely such as are sufficient to determine the arrest; when this is ascertained, recourse must be had to the forceps. But it is very improbable that you will meet with a case where such an operation is necessary. That accidental displacement by which the antero-posterior measurement of the head is fixed across the cavity of the pelvis, has been already alluded to. This is the most easy to correct of any of these deviations, but if it be left too long arrested, you may not be able to press up the forehead with the fingers; the vectis may therefore be applied for the purpose of altering the direction. The last irregularity that we shall speak of is when *the forehead becomes the presenting part.* In these rare cases, the forceps must be employed to extract the head. You will find it to be a very difficult operation, and one which requires great caution in the performance. These are the principal varieties of position which may cause delay in the second stage of labour.

The next cause of difficulty we have stated to be that in which

the head of the child is too large and too much ossified. This will require a more attentive consideration, because it appears to me that this increased development of bone occurs most frequently in male children; and through the elaborate researches of Professor Simpson, of Edinburgh, we now have statistical proof—1st. "That the dangers and difficulties of parturition are *greater to the mother* in male than in female births;" and 2nd. "The dangers and accidents from parturition and its results are *greater to the child* in male than in female births." Professor Simpson correctly attributes these effects to the greater size of the head at birth in male infants, a fact already noticed by the late Dr. Joseph Clarke, of Dublin. I should be disposed to add, that not only is the size greater, but the ossification of the bones is more advanced, and therefore they are less disposed to yield. The head of the healthy male child is rounder, and the fontanelles smaller. That of the female, more oblong, and the fontanelles more distinct. These characters, along with the increased size, contribute to produce greater difficulty in its passage through the pelvis. The head being too much ossified, is therefore a very frequent, and too often a very embarrassing cause of delay in the second stage of labour. When a vaginal examination is made, the posterior fontanelle is not distinctly felt; it seems to be only a central point to which the lambdoid and sagittal sutures converge; the sagittal suture is indistinct, the head presenting a round, firm, equal surface. When the head is so formed, it will generally pass safely through a pelvis of the average proportions, although slowly and with difficulty. It is when the pelvis deviates from the standard, and is diminished in its proportions, that these difficulties increase to a dangerous extent.

As far as I have had the opportunity of judging, this kind of head is very often met with when the pelvis is in a similar condition—too much ossified. I shall have again to bring before your notice the varieties of the pelvis which have been described to you in the commencement of the course, and I shall beg your attention especially to that variety which possesses many of the characters of the male pelvis, and to take it in connexion with the large, round, ossified head of the male child. This is of essential importance when we have to compare it with other varieties in the head and in the pelvis, and to derive from these facts a conclusion as to rules of practice. At present I shall

only direct your attention to the propositions I have quoted as established by Professor Simpson. The valuable report by Dr. Collins, of the practice of the Dublin Lying-in-Hospital, has been the basis of his calculations. I am happy to have it in my power to confirm Prof. Simpson's statements by the results of my own experience in the same hospital. Having noted all those cases in which the duration of labour extended to or exceeded twenty-four hours, the following results were obtained in reference to this question:—

There were in the total number of patients delivered (5699), 213 such cases, of which five were twin births; 126 of these were boys, and only 92 girls, or in the proportion of three to two. Forty-six of the boys died, thirty-five of the girls, being nearly one-third of the whole number. About eighty of these 213 cases occurred when that hospital was under the superintendence of Dr. Collins, and are therefore included in 16,654 cases reported by him; the remainder were observed during the two years subsequent to that report. From these facts, then, you may conclude, that the majority of cases where labour is difficult are those with male children; and as the greater size of the head is proved to be the cause, the difficulty must be in the second stage, and they belong, therefore, to the class of laborious labours which we are now considering. We have stated that in these instances also the head is more advanced in its degree of ossification. Hence you will perceive that this cause of difficulty, dependent upon the child, embraces a very large and important class of cases.

The next cause is of a very opposite character. *The hydrocephalic head*, it is true, is enormously increased in its size, but its ossification is retarded; and it might rather be compared to a bag of fluid than to the solid tumour which the head generally presents. Hence some of these cases are attended with no difficulty; and instances have occurred to me, in which the head, though morbidly enlarged, passed easily through the pelvis, but, on the other hand, some of the very worst cases in obstetric practice have depended upon this cause. As a proof, I place before you the very opposite results of the practice of Dr. Collins and Dr. Lee on this point. Dr. Collins gives six cases in which the child was still-born, from hydrocephalus. In three of these cases labour lasted only one hour; in a fourth only two hours;

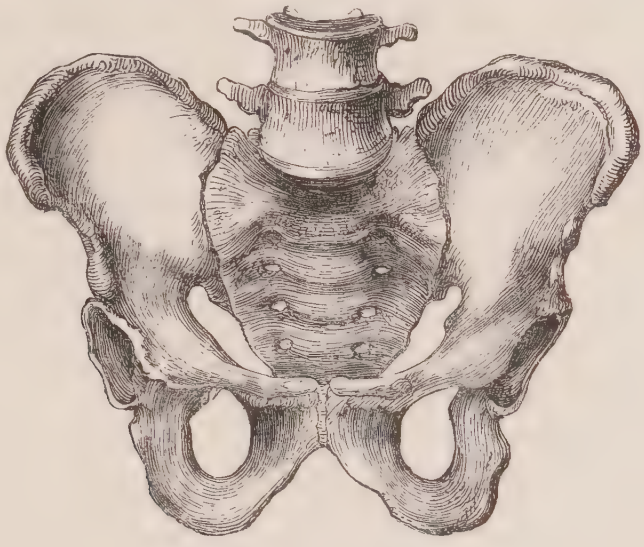
the fifth was twenty-six hours in labour, not stated to be severe; the sixth was brought into the hospital, after being thirty-two hours in severe labour. In none of these cases did the mother suffer. Dr. Lee gives five cases:—one, twenty hours in labour; one, sixty hours; one, seventy-two hours; the fourth stated as being "very long;" the fifth, "too long" in labour. In three of these cases, the mother died; two of them in consequence of the uterus being ruptured. These last two cases are detailed at length by Dr. Lee in his lectures.*

If it were necessary to bring forward additional proofs to convince you of the importance of educating your sense of touch so as to distinguish the different positions of the head, such instances as these would afford abundant evidence. It is obvious to you, that if the cause of delay were known to be hydrocephalus, no patient should be suffered to remain "very long in labour." The disease is fatal to the child; and if the head be arrested, there is no other operation than to perforate the head and discharge the fluid. The practice is self-evident when the cause of difficulty is understood. But when a patient is allowed to remain "too long in labour," under such circumstances, it can only arise from an imperfect education in the sense of touch, in consequence of which the true condition of the head is unnoticed. Those who are quite satisfied that the head presents, without caring much how it is situated, will be liable to those mistakes; but when, by a constant and careful attention, you acquire facility in recognising its different positions, you will at once detect the remarkable change which hydrocephalus produces in the characters you have been accustomed to notice. The increased size of the posterior fontanelles, the mobility and separation of the sagittal suture, the great overlapping of the parietal bones during a pain, if the head have entered the pelvic cavity, and the general looseness of these bones, would sufficiently point out the nature of the case and determine the practice.

Such are the principal causes of difficulty depending upon the head of the child, in the second stage of labour. The most important of these is certainly that in which the head is too large and too much ossified—the head of the male child. Let us now

* It is right to state, that these cases, recorded by Dr. Lee in his "Clinical Midwifery" (pp. 54—60), were cases in which Dr. Lee's assistance was required, not those attended by him from the commencement of labour.

turn to the difficulties presented by the pelvis; and, to prevent confusion, we shall assume that the head presents in the first position.



Masculine Pelvis.

It will not be necessary again to enter upon a detailed description of the varieties in the irregularly formed pelvis; it will be sufficient to recapitulate briefly those leading points of difference that are of practical importance; and with this view we would beg of you to consider attentively that form of pelvis which has been described as *resembling the male pelvis*, to compare it with *the pelvis deformed by disease*, and to observe the points of contrast between them. The first to which we would direct your attention, is the difference in the degree of ossification. The pelvis resembling the male is more osseous than the standard pelvis; the diseased pelvis less so. The former we shall call (for brevity) *the masculine pelvis*, and proceed to consider its especial characters. *Its weight* is greater than the ordinary pelvis, in consequence of the increased deposition of bone; but, what is more important, this deposit occurs in most unfavourable situations. The symphysis pubis is very narrow, and a bony ridge is sometimes formed behind it. The spine of the ischium is longer, and drawn inwards. The tubera ischii are larger and rougher, from the same cause. There is much less mobility in the sacro-coccygeal articulation, and the sacro-iliac synchondrosis is perfectly unyielding.

Its *shape* is unfavourable to the passage of the head. The brim is rather lessened in its transverse and oblique measurements; but the difficulty which this pelvis presents is not generally at the brim, it is rather at the pelvic cavity that an arrest or impaction

takes place. The cavity is much deeper than the standard pelvis, and becomes narrower towards the outlet. The head often passes down almost to the outlet, and then becomes *impacted*, because the arch of the pubis is too narrow to allow the occiput to escape from the cavity; it is therefore driven down still further, and becomes fixed between, or above, the tubers of the ischia. Its advance is also opposed by the resistance of the coccyx, and perhaps the spines of the ischia. The head may be arrested before it reaches the outlet, in consequence of the difficulty of its rotation towards the conjugate axis of the pelvis.

If, in addition to these impediments depending upon the shape of the pelvis and its increased ossification, you should be obliged to contend with obstacles arising from the large and ossified head of the male child, a very embarrassing combination of difficulties would present itself, requiring the most skilful treatment to bring to a successful issue. They are, however, of a character perfectly the opposite to those more generally described—the difficulties of the deformed or diseased pelvis—the only cause of embarrassment depending on the pelvis, which is pointed out by the majority of obstetric writers. Let us, then, contrast the one with the other.

The softened pelvis has *a less deposit of bone* than the standard pelvis. The symphysis pubis is often wide and perfectly smooth; the tubera ischii small. The articulations are less resisting, and I think I might add, on the authority of some recorded cases, the pelvis itself is capable of some degree of expansion. The shape of the diseased pelvis is never uniform. In that which is generally attributed to *rickets*, the brim is oval, and, in the extreme deformity, is of an hour-glass shape; the cavity is shallow; the outlet very wide; the coccyx abruptly curved.* The principal difficulty in such a pelvis is at the brim, the antero-posterior measurement being too narrow; but if this be overcome, no other impediment presents itself but the coccyx, which although abruptly curved, is generally sufficiently flexible to oppose but a slight resistance to the head of the child. In that deformity which is ascribed to *mollities ossium*, in *the cordiform pelvis*, its irregularities impede the passage of the head, both in the brim cavity, and outlet.† If the head pass through the cordiform brim, it is still opposed in the cavity by the planes of the ischium,

* Fig. 1, p. 29. † Fig. 2, p. 29.

which are pressed inwards: the pubic arch is also too narrow to allow the head to escape. The coccyx is abruptly curved in the same manner as in the former pelvis, from which it differs in the close approximation of the tubera ischii. The extreme of such a deformity would render the passage of the child impossible; it is only, therefore, to cases of slighter deviation into this irregularity that our present remarks must apply: we would call your attention to those instances alone where the head of the child may pass through the pelvis slowly, or may be drawn through it with difficulty. Contrasting a pelvis of this kind with the masculine pelvis, and assuming that the pelvic cavity in both presents the same apparent contraction, still the difference in the degree of ossification must cause a corresponding difference in the degree of opposition to the passage of the head. The articulations of the softened pelvis, although not actually moveable (even this is asserted by some), are yet capable of yielding, to a certain extent; the bones themselves may admit of slight expansion, and if we might admit the probability that the head of the child is also less ossified, you will perceive a strong contrast to the difficulties which the masculine pelvis presents under apparently similar circumstances.

It is necessary to request your attentive consideration of these differences, in order to render intelligible to you some very difficult questions connected with the rule of practice in such cases. The contrast is not confined to the pelvis alone; but, as you might naturally anticipate, there is a similar difference in the constitutional strength and temperament of the parturient woman.

We have already briefly alluded to the characteristics of those strong, muscular, masculine women with whom the pelvis is unusually ossified, who have often great rigidity of the passages, and with whom we sometimes find that almost undilatable rigidity of the os uteri. Let us now point out to your notice those feeble habits whose unhealthy constitutions are indicated by these evidences of disease in the pelvis. They are generally of a leucophlegmatic temperament; the subjects, perhaps, of that cameleon disease, hysteria, therefore nervous and excitable, of fair complexion, soft skin, bones fine, but swollen at the joints, the flesh often flabby, and the tissues relaxed. In such habits the os uteri is seldom rigid, the vagina is smooth, and very yielding, and if leucorrhœa have existed, may be even flaccid; the

perinæum is also quite dilatable. Inflammation is not so readily excited in the passages as in the former case, and the whole difficulty of the case in this second stage is, as it were, centred in the pelvic deformity.

It should be also noticed, as a constitutional difference, that in these feeble habits the uterus does not possess the same energy; it is sooner fatigued, and exhaustion would be more readily induced if its action were greatly prolonged, than in the former class of patients. You perceive, therefore, that two cases which present precisely the same apparent amount of resistance to the passage of the head may be perfectly opposed in every other respect, and consequently, that the same treatment, if applied to both, might be mischievous to either. It is essential to point this out to you, because rules of practice are too often laid down by authors as being applicable indifferently to all cases which present the same amount of disproportion, and hence a great deal of useless controversy has sprung up as to those rules, in consequence of the opposite experience of the disputants; for example, if the question be as to the rule when instrumental aid is called for. The practitioner who meets with the diseased pelvis as his chief cause of difficulty, and living perhaps in a manufacturing town, or other unhealthy district, who finds the majority of his patients to be those we have just described to you, such a practitioner would find that he could not suffer his patient to continue in labour beyond a certain period, without great hazard to her life and to his own reputation. He would also have it in his power to deliver his patient with the forceps successfully where the disproportion was such, that had it been the masculine pelvis he would have done irreparable mischief. It is not surprising, therefore, that his opponent, accustomed to a healthy district, and meeting with cases where the chief difficulty arises from a pelvis of the latter kind, should wonder and protest against such temerity. The judgment of each, as to the rule, may be correct, but the experience upon which it is founded being different, the opinions must of necessity be opposed when they attempt to argue *a particulare ad universale* (as logicians have it), without exercising a just discrimination on those points of difference that I have attempted to lay before you.

Having made these general observations on the irregularities of the pelvis, as causes of delay in the second stage of labour,

permit me now to direct your attention to the manner in which the head of the child is retarded by the different causes mentioned.

The head may not be able to enter the brim of the pelvis; it may become fixed within the brim; it may pass through the brim, and remain arrested in the cavity; and, lastly, it may meet no impediment until it is almost expelled, when its advance is opposed just at the outlet. Let us consider each in detail.

The head may not be able to enter the brim of the pelvis.—This may happen when the head is hydrocephalic, or the brim of the pelvis much deformed. In the former case, the moment it is ascertained, as we have already stated to you, the head must be perforated. In the latter, it is of importance to determine the degree of disproportion in the brim, in order to decide on the practicability of delivering the child. In the extreme deformity of either the ovate or cordiform brim, when the antero-posterior measurement is, perhaps, only an inch or an inch and a half, it would be impossible to do so *per vias naturales*;* and therefore, the Cæsarian section, or what might be called delivery *per vias præternaturales*, becomes a question for your consideration. But the deformity may not be extreme, and yet the head be prevented entering the brim. It is such cases as these that cause the practitioner the most embarrassment, and which present to him the greatest difficulty as to the course he should pursue. It is for the purpose of determining the rule in these cases, that our professional mechanicians have contrived an endless variety of pelvi-meters. It is for this object that the profession have made many fruitless efforts, and even entered upon no little controversy, to determine the least possible space through which the child might pass. I shall not occupy your time uselessly with their discussions, but shall only point out to you the errors you must avoid. Recollect that the child must be delivered by destructive instruments, that its sacrifice is involved in the question you have to consider; and this remark applies equally to those who have the temerity to apply the forceps when the head is above the contracted brim of the pelvis. Whether the forceps or the crotchet be employed, the result to the child is the same; the only difference being, that in the former case the hazard to

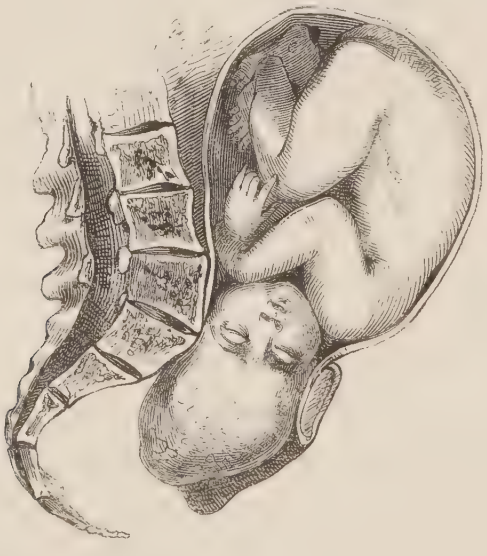
* In Elizabeth Sherwood's case, delivery was effected by the crotchet, when the antero-posterior measurement was less than an inch. But this exception is so remarkable as rather to prove the rule.

the mother's life is greatly increased. You must not, therefore, place implicit confidence in the accuracy of the measurement that you make of the pelvis, and at once proceed to operate, because it is, or you think it is, within the space through which the head may pass; you might be altogether deceived; and every experienced practitioner knows how often he is deceived in the estimate he forms of the space in the pelvis, although the utmost care may be taken to determine it. Do not, therefore, trust to pelvi-meters, however ingeniously contrived; rather let time and a close attention to the symptoms which present themselves decide your practice. When the character of the labour is changed, when inflammation begins in the passages, when the premonitory symptoms of exhaustion appear, when, after a reasonable time has elapsed (say six hours), without the head making any progress, although the os uteri is quite dilated and the pains have continued regular and powerful,—when any of these conditions are met with, and you have reason to think, from an examination of the pelvis, that the brim is too contracted, then, but not until then, are you justified in interfering. The simplest, and, we might add, the most efficient pelvi-meter, is the hand of the practitioner. If it be the educated hand of the experienced obstetrician, the evidence is certain; but even the attentive student may acquire much accuracy by observing a few simple rules. In ordinary vaginal examinations, when one finger only is introduced, the superior part of the sacrum is quite out of reach. When the point of the finger, therefore, touches the upper part of the sacrum, it is evidence that the sacrum must be pressed too much forwards; but if it touch the promontory, or just below it, the contraction at the brim must be such as to render it very doubtful if the head can pass. The length of the forefinger is four inches; but from the resistance of the soft parts, as well as of the remaining fingers which are without the vulva, not more than three inches of the forefinger can pass within the pelvis. If, therefore, the distance between the arch of the pubis (taken below the subpubic ligament and soft parts adjoining) and the promontory of the sacrum be only three inches, that between the superior surface of the symphysis and the same point must be less than three inches. You may then take it as a rule, that if your forefinger touch near the promontory of the sacrum, the head will not pass. In more doubtful cases, there are other modes of examination to

confirm your suspicions. In some cases, when the cavity and outlet are very wide, the whole hand may be introduced, and the degree to which the fingers are pressed upon when passed towards the brim of the pelvis will be your guide. In the standard pelvis, the fingers may be slightly separated from each other. In the pelvis which is contracted at the brim, but through which the head might pass (at least to a certain distance), the fingers are pressed close, but not so as to overlap each other. In greater degrees of disproportion, the fingers cannot be passed forwards without overlapping, and the degree to which this takes place will indicate the amount of contraction in the brim of the pelvis. In extreme cases, three, two, sometimes even one finger will hardly pass between the sacrum and the pubis. In other cases, where this cannot be done in consequence of the outlet being also distorted, you have, in this circumstance, additional evidence of the character of the pelvis. In some instances, the ischio-pubic rami are very close, and the coccyx abruptly bent; in others, having the same alteration in the coccyx, the symphysis pubis is pressed down towards it. In these varieties it is difficult to make an examination. Only one finger, generally, can be introduced, and if, with this distortion of the outlet, you find the sacrum also pressed forwards, you can hardly hope that the head will pass the brim. These modes of determining the disproportions of the pelvis are far more convenient, and (as it appears to us) are quite as efficient as the more complicated contrivances to which we have referred. But, with the exception of very extreme cases, we would again caution you not to assume too hastily, even with every evidence in this way obtained, that the head cannot pass the brim, until time and a close observation of the labour removes every doubt.

The head may become fixed within the brim.—This might occur with any of the irregularities of the pelvis that have been described to you. The degree of disproportion may be just sufficient to allow the head to enter the brim, and no more; but as, in the majority of these deviations, the cause retarding its advance exists in the pelvic cavity, such instances may be most conveniently included under the next division. At present, I would direct your attention to one, and only one variety of the deformed pelvis where the head is often fixed in the brim. In the ovate pelvis (that which is produced by rickets), the conjugate measure-

ment of the brim is diminished, while the transverse and oblique are increased, the cavity is shallow, the outlet wide. When the head, therefore, has entered the brim, and is there arrested, the conjugate measurement is the only cause of obstruction; but if this difficulty can be overcome, the head would rapidly advance. Such seems to be precisely the case where the long forceps may be applied with the most success. The shape of the brim is very favourable to its application, and if the head can be drawn through the brim safely, no further difficulty remains (vide p. 183). We would desire to impress this fact the more upon your minds, because it is necessary to discriminate between the application of the long forceps in this especial case, and its use when the head is in the same situation in other irregularities of the pelvis, and also because this kind of arrest is much more frequently described, and even figured (as you see in this plate of Smellie's), than those which we believe to be more commonly met with. When the head is thus fixed in the brim, its long axis corresponds exactly to the transverse measurement. The bi-parietal space is compressed between the sacrum and pubis, hence it would be impossible to feel the ear of the child; the sagittal suture is overlapped, but there is always sufficient space between the head and the sides of the pelvis to introduce the blades of the long forceps.



Head fixed in the brim of the pelvis.—(*Smellie.*)

The head may pass through the brim, and remain obstructed in the cavity.—This division embraces the largest number of, and the most important, cases you have to consider. It is to this that the observations apply which we have previously made, in re-

ference to the large and ossified head of the male child, the masculine pelvis, the cordiform variety of the deformed pelvis, and the constitutional differences to be noticed in these cases. It is here that the rules of practice are the most contradictory; and however difficult it may be to do so, it is in such cases of the utmost importance that they should be, as far as possible, determined. We shall therefore first lay before you the characters of this obstruction, both in its slighter form, when it is called "*arrest*," and in its increased degree, when it is named "*impaction*," and then endeavour to deduce, from the facts within our reach, a safe conclusion as to the rule of practice.

The term "*arrest*" is applied to those cases where, although the head ceases to advance, the cause either does not depend upon disproportion in the pelvis, or, when disproportion exists, it is not so great as to render the delivery of a living child impossible. For instance, when the uterine pains are feeble and inefficient, if the position of the head be unfavourable, or if the arm descend with the head, its progress may be *arrested* without any irregularity in the pelvis. The term "*impaction*" is employed when the head not only ceases to advance, but when there is every evidence that its further progress is beyond the power of the uterus. The use of this term is therefore confined to those cases in which there is great deformity in the pelvis, or to those in which a very large and ossified head is wedged in the deep narrow cavity of the masculine pelvis.

When the head is *arrested* in the pelvic cavity, it may be readily distinguished from the *impacted* head. In the former case, if the head be slightly pushed back, the finger can be passed with facility between the head and the pelvis, the ear may be touched, the parietal bones do not overlap each other strongly, the scalp is only puckered, or, if a tumour be formed on the presenting part, it is diffused, increases slowly, and seldom attains any magnitude. In the latter instance, when the head is *impacted*, it cannot be so easily displaced; it is impossible, without force, to pass the finger between it and the symphysis pubis; the ear cannot be felt, and the urethra is compressed. The parietal bones are strongly overlapped, and cause the sensation to the finger that is expressed by the homely simile of "the sow's back;" a tumour grows very rapidly, and to a great size, often completely obscuring the character of the presentation;

the vagina is also swollen and congested. If, however, the death of the child take place, it becomes less in size, softer, crepitant, and œdematous, while the serrated edge of the suture may be felt still more distinctly.

Having given this explanation of the terms which are commonly employed to signify the different degrees of disproportion, and having pointed out to you the characters by which they may be known, we shall proceed, in the next lecture, to consider the management of those cases where the head is delayed in the pelvic cavity.

LECTURE IX.

LABORIOUS LABOURS.

Symptoms of Inflammation—Of Exhaustion—Treatment—Different Degrees of Disproportion in the Pelvic Cavity—Case in which the Head moves very slowly through the Pelvis—Opposite Opinions as to its Management—Discussion of the Question—Attempt to determine it by Statistical Results.

In the preceding lecture we pointed out to you the manner in which the head may be impeded in the pelvic cavity, and explained the terms used to designate the different degrees of disproportion. We shall now bring before you the effects that result therefrom, those symptoms that indicate danger in labours of this class, and the general treatment required to secure the patient from injury. We shall then endeavour to determine, as far as is possible, the circumstances that justify artificial assistance, and the nature of the aid that is called for. You will recollect, that, in speaking of the second stage of natural labour, we directed your attention to the striking change in the action of the uterus when the waters were discharged and the os uteri fully dilated.* The action then becomes much more powerful, and the effort to force the child forward is assisted by every muscular aid that can be called into action by the patient. Hence the danger that may arise if the advance of the child be opposed by any unusual resistance from the pelvis. If the head be arrested, but still more if it become impacted, the most serious consequences might follow, if not prevented by a judicious treatment. It is therefore necessary, in all such cases, that you watch very closely any alteration in the symptoms that accompany the struggle, in order to foresee the approach of danger, and to

* Page 60.

enable you to act with that promptitude and decision which the circumstances require.

The unfavourable results that follow these labours, and, indeed, the majority of all difficult labours, depend generally upon one of two causes—inflammation or exhaustion. Inflammation of the passages may arise, and, if it proceed to any extent, may terminate either in slough of *some part* of the vagina (more especially the vesico-vaginal septum, because most exposed to pressure), or in slough of the *whole vagina*, if the inflammation assume an erysipelatous character, or perhaps in *slough and laceration* of the portion of the vagina connected with the neck of the uterus, thus leading to *rupture of the uterus* itself. Each of these consequences, although differing in degree, is equally to be avoided. It is therefore important to observe the earliest symptoms of inflammation.

Another cause of danger is *exhaustion* of the uterus. When the uterus becomes powerless, artificial assistance is absolutely required to deliver the child. The danger, however, does not consist in this necessity, but rather in the cause that led to it. Atony of the uterus is not easily produced; and when it occurs, the shock of the constitution is very great. Sudden death has been the consequence of it; and the patient is always placed in imminent danger, because of the symptoms of constitutional disturbance which present themselves. Beside this, the uterus having lost to a certain extent its power of contraction, hæmorrhage may be the result; and this increases the exhaustion of the patient, and, consequently, the danger of the case.

Hence, one of the most serious effects that can follow prolonged labour is, that the patient becomes, in the *true meaning* of the term, exhausted. It is one which should be guarded against by every precaution, and one which justifies the most prompt interference the moment any indication is given of such an unlooked-for alteration in the constitution of the patient. But do not confound exhaustion with mere fatigue. Fatigue is the ordinary effect of long-continued exertion, and, therefore, of long and severe labour; exhaustion, a very rare result of it; nevertheless, the term exhaustion is applied indifferently to express both effects. The patient will tell you that "she is quite *exhausted*." Her friends will exclaim, that "she will sink from *exhaustion* if not relieved." This language is well understood

and appreciated by the intelligent practitioner in cases where there is no exhaustion whatever; but we fear we must add that it is an appeal very readily listened to by some who are not quite so prudent, and who feel quite as much inconvenience from fatigue as the patient. You must not be betrayed into impatience from such a cause, but rather steadily observe the character of the labour, and be prepared to recognise the earliest symptom of exhaustion the moment it presents itself. Thus you will be able to interfere with promptitude when your assistance is required, and, on the other hand, will not be hurried by these urgent solicitations into an unnecessary, and perhaps an injudicious, attempt to terminate the labour.

When the head of the child moves very slowly, or ceases to advance through the pelvic cavity, the second stage of labour is often greatly lengthened. In such instances, the uterus continues to act for a certain time with the same power as before; but if no effect be produced, its action is suspended in the same manner as in the first stage, only for a shorter time. When the pains are renewed, they are not so strong as before; the uterus seems, as it were, conscious of the difficulty; the pains are shorter, although very often severe. At this time the woman is disposed to use every effort to force the child forward, and, impatient of the delay, will strain with all her strength: failing in her object, she becomes alarmed and dispirited, and her mental anxiety still further interrupts the action of the uterus. She should therefore be dissuaded from fruitless attempts of this kind, because nothing is so well calculated to excite inflammation, if not to produce exhaustion. It is the more necessary to point out this to you, because the patient is too frequently recommended to adopt this very practice. She is often desired "to bear down with her pains," and "to assist herself" at a time when she can give herself no assistance whatever.

After this comparatively feeble action of the uterus has continued for some time, the pains return in their former strength, especially if the patient has had even momentary sleep. If the difficulty be still insuperable, they may either again cease, or continuing, may produce inflammation of the passages. When this is in the least degree indicated, the pains are very short, extremely severe, and in their intervals the patient still complains of pain, and a feeling of soreness. If the uterus be examined

through the abdomen, you will observe a very perceptible difference in the sensation it communicates. It feels almost as hard and contracted in the interval as during the pain; the patient cannot bear to have the abdomen touched. Beside this alteration in the character of the pains, we have other symptoms, both local and general, to guide us. Febrile irritation, which had been previously absent, shows itself; the pulse becomes quick, frequent, and not easily compressed; the tongue is dry, and the patient has great thirst; the countenance is anxious, and the features slightly collapsed; there may be a distinct rigor, but more usually there is but a slight chill. Locally, the vagina becomes hot and tender, the mucous secretion ceases; it is therefore dry, or, if the inflammation increase, a serous discharge may be substituted. When inflammation thus commencing is neglected, and it extends to the uterus, there are further local changes depending upon the effect produced on the contents of the uterus. The membranes undergo decomposition, and then a thick, yellow, oily, and very offensive discharge flows from the vagina. This is increased if, the death of the child having taken place, its tissues undergo a similar change. You should bear in mind, however, that there are cases where the death of the child may have taken place either in the beginning of labour, or before it has commenced. In such instances, putrescency may take place rapidly, and similar appearances to those just mentioned might present themselves without any inflammation having existed; you must not, therefore, confound the dark and fœtid discharges from the vagina, that depend upon such a cause, with those that occur in connexion with inflammation of the vagina and uterus.

When the head remains in the cavity of the pelvis, and the least tendency to inflammation is manifested, the most prompt and decided measures are necessary. In strong and plethoric habits, free general depletion, followed by nauseating doses of tartar emetic, emollient enemata, and local fomentations, will check the advance of inflammatory symptoms, and give time to determine the important question as to the delivery of the child. In those feeble constitutions where you have reason to dread lest exhaustion should ultimately take place, you cannot employ general depletion, nor any means that would reduce the strength of the patient to any extent. It is preferable to deplete locally, to use fomentations, enemata, and, after the bowels are evacuated, to

give a *moderate* dose of liquor opii sed., combined with some diaphoretic. Inflammation does not so readily arise in these cases, and when it occurs it is more easily arrested; but exhaustion would be much more likely to follow prolonged labour than in those more robust constitutions we have alluded to. Both cases demand from you an equal attention; but you perceive it must be directed to a different object. We shall therefore briefly detail to you those premonitory symptoms that indicate the approach of exhaustion. When the uterus is becoming weak, and its strength is, in the strictest sense of the term, almost exhausted, the pains become short and inefficient, the intervals between them longer, and sometimes they are quite suspended; but the nervous system being excited, the patient derives no advantage from such suspension. She does not sleep, but continues watchful, anxious, and restless; the pulse is increased in frequency, is very easily compressed, and its pulsations are disturbed and rendered irregular by the most trifling causes. The countenance of the patient is peculiar. To say that it is collapsed would not convey its exact expression. Watchfulness and anxiety are portrayed on features that equally indicate languor and listlessness. An observable change takes place, but to explain how is not easy. If these monitors be neglected, further symptoms of constitutional disturbance will soon present themselves. Constant watching, increased restlessness, hurried respiration, irregular chills, and slight delirium, all rapidly succeed each other, and hasten to the most unfavourable conclusion. When there is the least reason to apprehend exhaustion, promptitude in delivery is imperative; but before interference is thus called for, much may be done to prevent its necessity. Rest is very important in these cases, because it is an evidence that the over-excited nervous system is tranquillized; therefore, when the pains are becoming weak, or return only at long intervals, a moderate dose of opium is often of great service: if the patient sleep, even for a short time, the uterine action is renewed with much more power. I have expressly stated a *moderate* dose of opium, because the case now under our consideration is that in which the same medicine has produced the most opposite effects, according to the dose administered, and, consequently, it has sometimes been discarded, because it has been misapplied. The object which it is intended to accomplish by opium, is to subdue the nervous irritation which

precedes exhaustion, and to restore, by rest, the energy of the uterus. The effect produced by too large a dose may be to paralyze all nervous power, and thus at once to cause uterine exhaustion. You must therefore exercise proper caution in the use of it; twenty to twenty-five minims is generally sufficient for the purpose. After a temporary rest has been thus produced, if the uterus still continues to act feebly, ergot of rye may be given in an equally cautious manner, carefully attending to its influence on the pulse, and especially on the circulation of the fœtus. If in either case, after giving this medicine, the rate of the pulsations be diminished, you must not persevere in its employment, otherwise the death of the child may be the result.* It is also necessary

* Ergot of rye should be given with great caution. Its effect has been closely observed by Dr. Beatty, and he is led to the following conclusions:—

"That the administration of ergot to a woman in labour is attended with danger to the child, whenever a time sufficient for the absorption and transmission of its noxious properties elapses before the child is born. The degree of effect produced, differs with the time that elapses between the exhibition of the dose and the birth of the child. Hence, the ergot should never be given in any case where there is a likelihood of the labour lasting more than *two hours* after its administration; except when it may be employed to save the mother's life; and secondly, if delivery is delayed to two hours, we should resort to artificial assistance to save the life of the child."—*Dublin Journal.*

Dr. Hardy has since made its effects the subject of his observation, and has drawn up a series of Tables to determine—

1st. The period after administration that its action commences.

2d. Its effects on the maternal pulse (when any), and how soon evident.

3d. Its effects upon the fœtal heart (when any), and how soon produced.

4th. The state of the uterus and lochial discharge during convalescence, in cases in which it has been exhibited.

1. It appears that, in some cases, ergot of rye acts on the uterus so soon as seven minutes after its exhibition, whilst in others a much longer period of time is required; from about ten to fifteen minutes may be stated as the average. In those cases where the children have been expelled alive, I have always observed the action of the uterus to commence within twenty-five minutes. On the other hand, when a longer period than this elapses before the uterus takes on action, the use of instruments has been necessary to perfect the delivery, or the children have been dead-born.

2. In nineteen cases there was a marked diminution in the frequency of the mother's pulse, following the administration of ergot. This effect generally began to take place from about fifteen minutes to half an hour. In all these instances, when the depression of the pulse occurred, the fœtal heart underwent a similar change. In several cases where the circulation of the patient underwent this depression from the action of the ergot, the effect continued several days.

3. In the majority of cases, a diminution in the fœtal heart's pulsations followed the exhibition of ergot. The period at which this effect begins to be pro-

to be careful to avoid the use of *secale cornutum*, if the delay in this stage arises from great disproportion between the head and the pelvis. It must be obvious to you, that in a case like this it would be very dangerous to use a means of exciting the action of the uterus, over which you can have no control. A preparation which exerts a specific influence on the uterus, which often causes the most violent action, and that not returning at intervals, as ordinary pains do, but which excites a *continuous* effort of the uterus to expel the child, is not the safest to employ when there is much resistance opposed to this action. The remedy, when cautiously administered, is useful, however, in those cases where the delay chiefly arises from want of power in the uterus, which may be exhausted if not thus artificially stimulated to action.

duced, varies from fifteen minutes to half an hour. The most common effect is a diminution in the frequency of the pulsations: this is succeeded after some time by an irregularity in its beats, which irregularity continues, more or less, until the sounds intermit, and at length after a variable period become quite inaudible. In those cases where the number of pulsations have been steadily reduced below 110, and *at the same time with intermissions*, the child will rarely if ever be saved, although its delivery should be effected with the greatest possible speed.

4. The volume of the uterus is often found much greater than after ordinary labours. In addition to this enlarged state of the uterus, it has sometimes a firmly contracted feel, which generally continues for several days. In a few instances the lochial was rather pale and scanty, although nothing unfavorable occurred during convalescence to account for this circumstance. With some few exceptions, the women had generally good recoveries. The children that were born alive, all, with one exception, did well. In this case, delivery was effected by the forceps, as the fœtal heart had fallen so low as 100 from the exhibition of the ergot. It died in three hours after delivery.

General Results of Dr. Hardy's Tables.

Cases in which the uterus expelled the child alive	7	
Cases in which the children were born alive by the application of the forceps or vectis (after ergot was given)	7	
		—14
Cases where the uterus expelled the child dead-born (after ergot) . .	15	
Cases in which the forceps or vectis were applied (after ergot), but the children dead-born	6	
The children dead (from ergot), delivery effected by the crotchet . .	13	
		—34
		—
Dublin Journal, vol. xxvii. p. 224.		48

From the above summary of cases given by Dr. Hardy, it appears that in forty-eight cases where ergot of rye had been given, thirty-four children were still-born,—nearly three-fourths !

Having given you this brief outline of the general treatment necessary in these protracted cases, we shall now enter upon the more difficult question of their management, to secure the delivery of the child, assuming that instrumental aid is not rendered imperative by the presence of inflammation or exhaustion. It is hardly necessary to state to you that there is every variety in the degree of disproportion between the head and the pelvis. In some instances it is so slight that the child may be safely delivered without any assistance; only it will occupy a longer time in passing through the pelvis. In others, the amount of difficulty may be so much increased as to render it doubtful whether the head can pass without assistance; and it is in these cases that the rules which are given for your guidance are the most contradictory. Again: you may have a still greater disproportion, in which there is no doubt about the improbability that the head can be expelled by the natural efforts of the uterus, although there is very great doubt, and no little dispute, as to the means by which the head must be extracted. Lastly: you have occasional instances in which the narrowness of the pelvis is such, or the magnitude of its distortion is so great, that the safe delivery of the child is hopeless: the head must be lessened; it must be destroyed before it can be brought into the world. In extreme cases of this kind, even this cannot be done; but recourse must be had to the difficult and dangerous operation of removing the child from the uterus by laying it open, in order to save the mother from the dreadful alternative of dying undelivered.

In those cases of slight deviation from the standard pelvis, where there is every evidence of space sufficient for the head ultimately to pass through the pelvis, if nature be allowed time for the purpose, you would not, of course, interfere with her; although I believe instances might be quoted where *very adroit operators* have, even in such cases, relieved the tedium of a long attendance by a ready application of the forceps. It is sufficient to say, that the united testimony of the profession, given in every standard work of midwifery, is opposed to such a practice; and if any accident should arise from this mischievous meddling, the operator is fully responsible for all the consequences that follow from it. But in those more doubtful cases, in which there seems hardly sufficient space for the head to pass safely through the pelvis, the practice is not so clear, nor is the evidence of the pro-

fession so unanimous on the subject. When, in such instances, the head is actually arrested, and so remains for some hours in the same position—a sufficient length of time to satisfy you that the uterus cannot advance it—if the ear can be felt, or the finger be passed easily between the head and the pubis, you may use the forceps to deliver the child, and I think the weight of authority will support your practice. But when the head is not so arrested, but, at the same time, advances so extremely slowly that it seems to be arrested, you have here the discordance of authorities at once confounding you. Burns devotes the greater part of a chapter* to prove the impropriety of delay under such circumstances, and advocates the application of the forceps in cases of arrest, or rather of slow progress of the head, because "in such cases then we may experience much evil from trusting too long to nature, but add little to the sufferings of the patient, and nothing to her hazard, by instrumental aid."† He applies the same principle to cases of impaction, which we shall presently consider. The evil he dreads is uterine exhaustion, if this second stage be much prolonged. In this view he has the support of the late Professor Hamilton, who equally dreaded delay. Dr. Campbell also gives a similar opinion, but more guardedly expressed. "It may, however, be repeated, that while the delivery is advancing, and the patient continues free from unfavourable symptoms, the use of the forceps is to be abstained from altogether. *But whenever the progress is slow and imperceptible*, and the subordinate means already recommended have failed to accelerate the transit of the fœtus, the case should be watched, and *this instrument applied with very little delay after the passages are prepared.*"‡ Other names might be added to this list of advocates for interference in the case supposed. But let us turn to the other side, and you will find the eminent names of William Hunter, Osborne, and Denman, opposed to this practice. Dr. Osborne would wait until exhaustion had actually taken place — a maxim for which he has been very severely, and I admit very justly, criticized. Dr. Denman's fifth aphorism states, "It is meant, when the forceps are used, to supply with them the insufficiency or want of labour pains; but *so long as the pains continue*, we have reason to hope they will produce their effect, and *shall be justified in waiting.*"§

* Burns, chap. vi. p. 428.

† Ibid., p. 434.

‡ Campbell's Midwifery, p. 281.

§ Denman's Aphorisms, p. 12.

When the pains cause the head to advance, although very slowly, they are producing their effect; and the case therefore comes within the limits of the aphorism. Dr. Collins observes, "Let it be carefully recollected at the same time, that so long as the head advances EVER SO SLOWLY, the patient's pulse continues good, the abdomen free from pain on pressure, and no obstruction to the removal of urine, interference should not be attempted, *unless the child be dead.*"* Dr. F. Ramsbotham's third rule on this point is, "If the head advance at all, and be not impacted, provided the strength and spirits are good, there is seldom need to interfere."† Dr. R. Lee's name might also, I think, be added, as being favourable to this rule of practice.

I shall not, gentlemen, so far trespass on your patience as to ask you to unravel with me this tangled web of contradictory experience. It is sufficient if I convince you of the difficulty of the subject, and if it induce you to give a patient attention to the only mode that I can adopt to draw a legitimate conclusion—that is, to derive it as nearly as possible from facts, without reference to opinions. I think this may be done. Bearing in mind that the great and leading principle to be observed in these difficult cases is, to preserve both mother and child, if possible, from injury, I think it is in our power to compare the results of cases where the forceps has been applied with those where it has been withheld, and thus determine the practice which presents the greatest success. We shall first direct your attention to the following tables of operative midwifery, derived from reports given by British and foreign practitioners; you will find in them the total number of cases given by each, the number of forceps operations, and the results to mother and child when they are given.

COMPARATIVE VIEW OF FORCEPS OPERATIONS AND PERFORATIONS.

British Reports.

Date.	Place.	Name.	Total Cases.	Forceps.	Deaths		Perforations.	Deaths: Moths	Total Operations
					Children.	Mothers.			
1781	London	Dr. R. Bland	1,897	4	—	—	8	—	12
—	Ditto	Dr. Merriman	2,947	21	6	—	9	—	30
1828 to 1843	Ditto	Dr. F. Ramsbotham	35,745	49	11	3	38	6	87
1787 to 1793	Dublin	Dr. J. Clarke	10,387	14	—	2	49	16	63
1826 to 1833	Ditto	Dr. Collins	16,414	24	8	4	79	15	103
1835 to 1837	Ditto	Dr. Beatty	1,182	9	4	—	3	—	12
1835 to 1840	Ditto	Dr. Churchill	1,640	3	1	—	12	1	15
1832 to 1835	Ditto	Dr. Murphy	5,699	14	5	1	29	6	43
			75,911	138	35	10	227	44	365
	London	Dr. R. Lee	—	55	38	9	127	23	182

* Collins' Report, p. 18. † Ramsbotham's Obstetric Medicine and Surgery, p. 309.

FOREIGN REPORTS.

French.

Date.	Place.	Name.	Total Cases.	Forceps.	Deaths.		Perforations.	Deaths: Moths.	Total Operations.
					Children.	Mothers.			
1797 to 1811	Paris	Boivin	20,357	96	23	—	16	—	112
1812 to 1820	Ditto	La Chapelle	22,243	77	18	—	12	—	89
			42,600	173	41	—	28	—	201

German.

1821 to 1825	Wurtemburg	Riecke	221,923	2,740	636	127	98	35	2,838
1801 to 1821	Vienna	Boer	26,965	100	—	—	43	—	143
1797 to 1827	Ghent	Jansen	13,365	341	—	—	5	—	346
1811 to 1827	Prague	Moschner	12,329	120	—	—	4	1	124
1825 to 1827	Bonn	Kilian	9,392	120	—	—	4	—	124
1814 to 1827	Dresden	Carus	2,549	184	—	—	9	—	193
1817 to 1828	Berlin	E. Siebold	2,093	300	—	—	1	—	301
1823 to 1827	Ditto	Kluge	1,111	68	14	—	8	3	76
	Heidelberg	Naegele	1,711	55	—	—	5	—	60
			291,438	4,028	650	127	177	39	4,205

You will perceive that in these tables the number of forceps operations in British practice is 138; in thirty-five of which the child was still-born, being in the proportion of one in every fourth case. In order to prevent error in this proportion, we have separated Dr. Lee's forceps cases; the total number of which given by him is fifty-five; the mortality of children, thirty-eight; which would be quite out of proportion (being more than one-half) if these cases were not carefully examined. I have endeavoured to do so, and to make the necessary corrections. In nineteen of these fifty-five cases, the forceps failed: they therefore became cases for perforation; of the remaining thirty-six cases, one-half the children, eighteen, were lost, but twelve of these eighteen were destroyed by other causes than the forceps. Deducting, therefore, all such cases from the whole number, the remainder will be twenty-four forceps cases, in which eighteen children were saved and six lost, being in the same proportion, one in four.

In the French reports, forty-one children were lost in 173 forceps operations, being one in four, nearly.

In the German reports of Riecke and Klugè, which state the mortality of the children, the number of their forceps operations united is 2808; the deaths of children, 650; being also one in four, nearly. Thus, then, we may conclude, that one-fourth of the children delivered by the forceps are lost. What is the result when these protracted cases are left to themselves? Is the

mortality increased? I do not think such will be found to be the case. In order to determine this question, I must refer you to Dr. Collins's valuable report—the only report which, from its extreme accuracy and minuteness, affords the elements upon which to form a calculation. Dr. Collins has given tables to show the duration of labour in all the cases he reports; he has also given separate tables to show the duration of labour in forceps cases, and in those which were preternatural. We may also assume, that perforation being only had recourse to "when, after the most patient trial, the impracticability of labour being terminated in safety by any other means was clearly proved,"* that all these cases exceeded twenty-four hours. From these data, then, we shall endeavour to draw a fair conclusion.

Cases of labour protracted to 24 *hours and upwards from Dr. Collins's Report.*

TOTAL CASES, 430.		STILL-BORN CHILDREN, 150.		MOTHERS DEAD, 40.	
Delivered by forceps	12	Still-born	4	Mothers dead	0
by perforating	79	Ditto	79	Ditto . . .	15
preternaturally	15	Ditto	6	Ditto . . .	0
naturally	324	Ditto	61	Ditto . . .	25
	430		150		40

From this table you perceive, that of 430 cases in which labour lasted twenty-four hours or exceeded it, 324 of them were natural cases, delivered without assistance, and that of these 324 the children were lost in sixty-one instances, which would be about one in five cases. The result of my own inquiries on this subject is nearly similar, and has been obtained from the same source, the Dublin Lying-in Hospital.

Report of 218 *cases of labour protracted to or beyond* 24 *hours.*

Delivered.	Cases.	Boys.			Girls.			Mothers Dead.	Causes of Mother's Death.
		Living.	Dead.	Putrid.	Living.	Dead.	Putrid.		
By forceps	14	4	1	—	5	4	—	4	1 Puerperal fever. 1 Rupture of uterus.
By perforations	29	—	20	1	—	7	1	6	1 Puerperal fever. 1 Rupture of uterus.
Naturally	175	76	19	5	52	22	1	8	3 Puerperal fever.
	218	80	40	6	57	33	2	18	

* Collins, p. 23.

In 5699 cases, 218 were protracted to this degree; and of these, 175 were delivered naturally, and forty-one children not putrid were still-born, being one in four, nearly. Thus, then, you perceive that, taking the widest, and, we would say, the fairest view of this question, the proportion of still-born children in these difficult and protracted cases is nearly the same, whether the forceps be employed or otherwise; that the difference, if any exist, is in favour of Dr. Collins's practice of leaving these cases to nature. But this is only one view of the question.

It may be said, and has been said, in the energetic language of Dr. Burns, that the mother must be considered. "From the strength of the recommendations of the partizans of nature, we should suppose that whenever the child could actually be born without aid, no hazard occurred; and, on the other hand, that instruments must of necessity prove not only very painful in their application, but dangerous in their effects. Now, the first supposition is notoriously wrong, for *innumerable instances* are met with, where the mother does bear her child without artificial aid, and much, doubtless, to the temporary exultation of the practitioner, but, nevertheless, death takes place, or at the best, a tedious recovery is the consequence."* Is such the case? It is totally opposed to my personal experience; on the contrary, I have been surprised at *the rapid* recovery of patients who have suffered this protraction, when I had erroneously anticipated, from that very circumstance, all the unpleasant consequences here detailed. But I would again ask you to put aside, for the present, individual experience, and examine the facts. In doing so, our data are more limited than those which assisted us in the former question, because, in the French reports, there is a most ominous silence regarding the mortality of the mothers—they say nothing about it. In the German reports, we are limited to that of Dr. Riecke, who gives 127 deaths in 2740 cases, being one in twenty-one, nearly. But take Dr. Churchill's more extensive researches on this question, from whose valuable work on operative midwifery these tables of foreign practice are partly formed. He states, that "amongst the French and Germans, in 479 cases, thirty-five mothers were lost, or about one in thirteen."† Dr. Churchill gives the proportionate mortality in British practice as one in twenty-one; but you perceive that, in the comparative

* Burns, p. 434.

† Churchill's Operative Midwifery, p. 134.

view we have placed before you, there were ten deaths in 138 cases, which is about one in thirteen. Compare this with the result where the cases have been left to the natural efforts. In Dr. Collins's report, there were twenty-five deaths in 324 cases, or one in thirteen, precisely the same as where the forceps had been used. Among those cases which I have observed, there were eight deaths in 175 cases, or one in twenty-two—a proportion in which I can place the more confidence, because it is derived from personal observation.

With regard, then, to the second question, the mortality of the mother, take the estimate in any way you please, and you must arrive at the same conclusion—viz., that the mortality is certainly not increased when these cases are not interfered with, and all the dreaded consequences which Dr. Burns anticipates from such practice have no foundation in fact. But we might even go farther: we might say, that so far from such evils following our Fabian practice, the evidence seems to point the other way, and to prove that the actual mortality is diminished. The twenty-five deaths reported by Dr. Collins include cases of puerperal fever, and other causes of death which might be called accidental, because he gives, under a distinct head, the number of deaths, the "effects of tedious and difficult labours."* These are just eleven cases, or one in thirty cases, nearly. The eight deaths which took place under my own observation, include three deaths from puerperal fever, leaving only five deaths from the severity and protraction of labour, which would be in the proportion of one to thirty-seven cases. Caution, however, is necessary, when we would derive a just conclusion from statistics. It is therefore possible, that if the reports of these forceps operations were more fully given, so as to separate the deaths from accidental causes from those resulting from the operation, the proportion of mortality would be diminished in the same ratio.† We do not wish you to assume more than what we think has been proved—viz., that the mortality of the mothers is not increased by leaving these cases to nature. The safety of the mother or child cannot, therefore, be advanced as a reason for instrumental delivery, when the head is making a very slow but a certain progress.

* Collins, p. 365.

† It is probable that the reports include deaths from puerperal fever, and those following delivery of the *impacted* head by the forceps.

One argument, however, has been much used by the advocates for interference, which is very clearly expressed by Dr. Burns: "Granting (he observes) the recovery to be excellent, is it no consideration that the patient has been subject to twelve, perhaps twenty-four, hours of suffering of body and anxiety of mind, which might have been spared?"* You must perceive that if this argument be worth anything, it will admit of a much more extended application than Dr. Burns would give to it. It might be employed to justify the use of the forceps in every case where the head was within reach, and labour at all severe. Because, why should your patient be exposed to *any* bodily suffering or anxiety of mind, if it were in your power to relieve her from her miseries? On this principle, the forceps might be used (as indeed they have been used) in every tenth case, and the practitioner relieved from the most anxious portion of his duties. But the design of nature will not thus be thwarted; and we might reply to such an argument in the language of Naegele—"If we admit that proportionate difficulties, according to the constitution of each individual, and an effort of strength (requisite in child-birth), are inseparable from the nature of this process, we must conclude *that an abbreviation of this process, though performed by an able hand*, before the salutary change, on which the preservation of health depends, has taken place in the organization of the mother, that a premature and sudden removal of these difficulties cannot be a matter of indifference; that such a violent interference with the functions of nature must incur the risk of destroying the health, though this should not ensue for some time after."† A more immediate injury, however, sometimes follows the application of the forceps in the case we are supposing, as well as in cases of impaction, which we shall have again to consider. The pressure of the instrument may cause slough of the neck of the bladder or the urethra, and thus establish a fistulous opening into the vagina; and the incontinence of urine that follows renders the patient's life miserable afterwards. It is difficult, in all instances, to trace this accident to the use of the forceps. When a forceps operation is described to us, we are seldom told that any mischief is the consequence. The splendour of success is very dazzling, and while we admire the operation, we are too often left in the dark as to the effects. Nevertheless, I have been able to trace

* Burns, p. 434. † Naegele's Mechanism of Parturition, by Rigby, p. 88.

this accident clearly to the use of the forceps in several instances. The usual account given by the patient is, "that she had been delivered by instruments, and the child's life saved." Dr. R. Lee, in his "Clinical Reports," gives a candid and clear statement of the results in the forceps cases he details. "Four died from the rash and inconsiderate use of the forceps; seven had the perinæum more or less injured; one had the recto-vaginal septum torn; five were left with cicatrices of the vagina, after sloughing; and one with incurable vesico-vaginal fistula."* Dr. Collins records only *one case* of vesico-vaginal fistula in the whole of his report of 16,654 cases—that was a case of perforation—consequently this accident never was found among those cases which were delivered naturally. The only case of fistula which occurred in the 5,699 cases to which I have so often referred, was one in which I employed the forceps to deliver a child that presented the forehead. The principal cause of difficulty in Dr. Collins's cases, was the large head of the male child forcing its way through a very osseous pelvis; the pressure on the soft parts must be very great, and if fistula could be produced by great protraction of labour in cases that ultimately were delivered without assistance, it must have been an accident of frequent occurrence in these cases, when the soft parts were so much compressed; but such did not happen, and therefore they afford a very favourable contrast to the cases delivered by the forceps in nearly similar circumstances. The intelligent practitioner would therefore hesitate to expose his patient to the risk of vesico-vaginal fistula, for the mere gratification of shortening the severities of labour.

We have been reluctantly compelled to dwell longer upon the management of this degree of disproportion than we desired. The difficulty of the question it involves, and the contradictions among the most experienced writers, must be our apology. In the case that we are considering, that in which the second stage of labour is protracted, and the head of the child advancing *very slowly*, we have shown you that there is no increased danger to the mother or child by leaving the case to nature in place of delivering by the forceps; that if there be any difference in the ratios of mortality, it is in favour of non-interference, and rather against the forceps. We have pointed out, as far as imperfectly detailed facts would enable us, that the post-partum accidents of labour

* Clinical Midwifery, p. 32.

follow operations with the forceps more frequently than cases which are left to themselves, and, consequently, the conclusion at which we must arrive, is hostile to the use of that instrument, under the circumstances stated. But recollect, that there is no general rule without an exception, and you will sometimes meet with cases so feeble in their habits that they will not endure a protracted labour without great risk of exhaustion; you may be called to patients where you dare not temporise, whom you must deliver although the head is making a tardy progress. We only ask you to consider these as the exceptions, not often met with, but still necessary to be studied and understood. It is for this reason we have brought before your notice the symptoms of exhaustion, and those which precede it; the same desire to direct your attention to the study of individual cases which may be exceptions to the general principle, we would wish to govern you, leads me to bring before you the varieties, not only in the formation, but in the resistance of the pelvis, so that you may know where an operation might be undertaken and where it cannot be attempted. If we have placed this subject before you with sufficient clearness, we shall conclude by directing your attention to that opposition in the practice of experienced authorities which has rendered its discussion so necessary.

Name.	Total Cases.	Forceps.	Proportion, 1 in	
Ramsbotham . . .	35,745	49	729½	London
Clarke	10,387	14	742, nearly	Dublin
Collins	16,414	24	684, nearly	Dublin
Boivin . . . . } Lachapelle . . . }	42,600	173	246	Paris
Boër	26,965	100	269½	Vienna
Kilian	9,392	120	78	
Carus	2,549	184	14	Dresden
Siebold	2,693	300	9	Berlin

Ramsbotham, one forceps operation in 700; Siebold, one in nine cases!

LECTURE X.

LABORIOUS LABOURS.

Management of Cases when the Head of the Child is impacted—Opposite Opinions as to the Application of the Forceps—Examination of the Question—Forceps as an Instrument of Compression—Baudeloque's Experiments—Perforation—Advantages of Auscultation —Case when the Head is retained at the Outlet—Accidental Obstructions — Ovarian Tumours — Polypus — Fibrous Tumours —Osteosarcoma.

THE object of our attention in the preceding lecture was to determine the rule of practice in those cases of laborious labour where the head advanced *very slowly*, and with much difficulty, through the pelvic cavity. The conclusion at which we arrived was opposed to interference under such circumstances. That the *general rule* should be to leave the case to nature, but at the same time to recollect that there are *some exceptions* to this rule, depending upon constitutional or accidental causes, where instrumental aid becomes necessary. We shall now examine the next degree of disproportion, that by which *the head is impacted in the cavity of the pelvis;* a case where the ear cannot be felt, where the soft parts suffer very great pressure, and where it is hopeless to expect the delivery of the child by the unassisted efforts of the uterus.

The management of cases where the head of the child becomes impacted has been, I regret to say, almost as much a question for controversy as that which we have just discussed. It is admitted that the child must be delivered by the resources of art, but how these resources are to be applied is the matter in dispute. Some consider that even in these cases the forceps, skilfully employed, may effect the object in view; the woman may be thus delivered,

and possibly the child preserved. Others dread such application of the instrument, because of the injury that may be done to the passsages, and consequently they esteem the probable danger to the mother to be a risk too great to encounter for the very slight chance of saving the child. Hence the question lies between perforation of the head of the child and its forcible extraction by the forceps.

It would be most desirable to determine the rule of practice in these very difficult cases, by an application of the same principle that was proposed to you in the last lecture. If we could compare such cases as have been delivered by the forceps when the head was impacted, with those in which recourse was had to perforation—if we could contrast the results—we might be able to arrive at a conclusion that would satisfactorily resolve our doubts upon the subject; but, unfortunately, that is impossible. We have no statistical knowledge of the effect of the forceps in these special cases; and the mortality that is reported under the head of perforation seems to be disproportionately increased by the circumstances under which the operation has been generally performed.

From the earliest period, the profession have been accustomed to look upon craniotomy with dread—I might almost say, with horror. A natural reluctance to destroy human life—no matter under what necessity—has been greatly increased in some countries by religious prejudices; and the anathema of the doctors of the Sorbonne still exerts an influence that paralyzes the judgment of the practitioner. Hence we read of cases allowed to remain several days in labour, until not only the death, but the putrefaction, of the child, gave evidence that the perforator might be employed without any stings of conscience. The result of such practice was, as might be supposed, inflammation of the passages, advanced to such an extent that the mother was sacrificed to this procrastination; and hence in the tables of mortality, we find that *one mother in every five*, and sometimes *one in every four*, died after the operation. We cannot, therefore, determine the rule of practice by statistical returns. We must only hope to do so by a fair examination of the question itself, by collecting the general experience of the profession, and by submitting to you the ground upon which we have formed the opinion which would govern us

as to the course to pursue. We do not wish you to adopt this opinion unless you are satisfied of its correctness; we but ask you to examine the subject dispassionately, and to discard from your minds the damnatory language that too frequently is employed by some obstetric authors. When you find an operation spoken of as "murderous," you are not disposed to become the murderers; you doubt and hesitate, and perhaps ultimately commit a *double homicide*. An appeal to harsh expressions is generally esteemed an evidence of weakness in argument; therefore, when you find these hard words, you can appreciate their value, and pass them by for more conclusive reasoning.

In order to compare the forceps and perforator in the case supposed, you must view the forceps as something more than a substitute for power of the uterus. In order to extract the head, it must also lessen its dimensions; it must be employed for the purpose of *compression* as well as for *extraction*. When we come to examine the different instruments used, you will find, in the varieties of the forceps, that some are shaped especially for this purpose, which is sedulously avoided in the construction of others—a sufficient proof of want of unanimity on this important subject. Let us, then, examine the forceps as an instrument for compressing the head of the child, so as to adapt it to the diminished space in the pelvis.

We have already evidence before us to prove that the power of the forceps for this purpose is extremely limited. The experiments of Baudeloque are referred to in almost every popular work on midwifery, and notwithstanding the critical objections raised against them, they are sufficiently important briefly to state them to you. Being desirous to determine the extent to which the forceps could compress the head, Baudeloque performed nine experiments on the heads of still-born children with Levret's forceps, an instrument of the strongest kind, and especially adapted for compression. The utmost force was exerted to reduce the head, a force so great as to bend one forceps, although highly tempered; the head was not lessened more than two lines, unless where the bones were unusually soft and loose, and then only to four lines. These experiments satisfied Baudeloque that the diminution could not be, in any case, so much as accoucheurs had stated, and that the degree of reduction should never be

measured by the distance between the handles, when pressed together, nor from the amount of force employed to approximate them.*

In these experiments, more force was used than you could venture to exert if the child were living, and yet the space

* 1627. Ces expériences ont été répétées de suite sur neuf enfans morts à l'instant de leur naissance, ou peu d'heures après, qui étoient d'une grosseur différente, quoique tous parfaitment à terme. Pour les rendre plus concluantes, nous fîmes en sorte de restituer à la tête de ces enfans, en la plongeant dans l'eau chaude et en la pétrissant un peu avec les mains, la souplesse que présente au toucher celle des enfans vivans, et nous nous servîmes du forceps allongé dont il est parlé au § 1614. Nous nous en procurâmes trois semblables, *de la meilleure construction et de la meilleure trempe.* Nous applicâmes cet instrument d'abord selon l'épaisseur transversale de la tête, comme nous le récommandons ailleurs; et ensuite suivant la longueur du crâne, c'est-à-dire une branche sur le milieu du front en descendant de la fontanelle à la racine du nez et l'autre sur l'occiput, pour connaître la réduction qu'on pouvoit opérer dans ces deux directions, et ce que la tête acquéroit dans un sens, en perdant selon l'autre. Quelque soit le degré d'écartement que laissèrent entre elles les branches du forceps à l'extrémité qui se termine en crochet, toutes les fois qu'elles furent placées sur les côtés de la tête nous les rapprochâmes exactement et nous les fixâmes dans cet état de contact au moyen d'un ruban, pour que la reduction de la tête ne variât point pendant que nous mesurerions de nouveau ces dimensions, et que nous les comparerions à celle qu'elle avoit avant l'expérience. *Baudeloque*, tom. ii. p. 17.

1635. On peut conclure d'après ces expériences. 1°. Que la réduction qu' éprouve la tête de l'enfant entre les serres du forceps est différente à quelques égards, selon que les os du crâne présentent *plus ou moins de solidité au terme de la naissance* et que les sutures, ainsi que les fontanelles, sont plus ou moins serrées. 2°. Que cette réduction ne sauroit être en aucun cas aussi grande que des accoucheurs l'ont annoncée, et qu'elle ira *difficilement et bien rarement, au-de-là de quatre à cinq lignes*, lorsque l'instrument agira sur les côtés de la tête. 3°. Qu'on ne doit jamais évaluer son étendue d'après l'écartement des branches de l'instrument, à l'extrémité opposée à celle des serres, et le degré de rapprochement qu'on leur fait éprouver avant d'extraire la tête, ni d'après les forces qu'on emploie pour les rapprocher ainsi. 4°. Enfin, que les diamêtres qui croisent celui suivant lequel on comprime la tête, loin de s'augmenter dans les mêmes proportions que celui-ci diminue, ne s'augmentent pas même pour l'ordinaire d'un quart de ligne ; et en deviennent quelquefois plus petits (Op. Cit., p. 20, 21).

The following are the results of eight experiments, briefly stated:—

No.	Reduction in Bi-Parietal M.	
1	3 lines	* At this degree of reduction, the suture was torn, and the brain escaped.
2	2 lines	* Instrument bent.
3	2 lines	
4	4 lines	Bones very soft, sutures and fontanelles loose.
5	4 lines	Equally soft.
6	4½ lines	The same.
7	3 lines	
8	2 lines	The ninth experiment is not stated by Baudeloque.

gained was scarcely sufficient to admit the blades of the instrument to be introduced within the pelvis. They seem to me, therefore, conclusive as to the limited power of the forceps when used as a compressing instrument. Nor can I agree in the opinion of Dr. Rigby, that "the slow and gradual pressure of the forceps, thus exerted [by tying the handles tightly together, and tightening them after every successive effort] upon the head of a living fœtus, will have a very different result to that of the experiments of Baudeloque and others, in attempting to compress the head of a dead fœtus by the application of a sudden and powerful force."* It is impossible to grasp the forceps for the purpose of moving the impacted head, without applying to it a sudden and powerful force; and if this force be maintained in the interval of the pains by ligature, such powerful, constant, and at the same time unequal pressure, acting on the head of the child, would appear to me much more hazardous than even the compression of the contracted pelvis, which is known to be a frequent cause of the child's death.

The possibility, therefore, of reducing by the forceps the impacted head to that degree that will enable you to draw it safely through the pelvis, seems to me extremely doubtful. If it were the large head of the male child, advanced in its ossification, and wedged in the deep narrow cavity of the masculine pelvis, I would say, it is impossible. The only case where it might, perhaps, be successfully attempted, is in the diseased pelvis, which may be capable of some degree of expansion, and where the head of the child, being less ossified, is softer and more compressible.†

Let me now direct your attention from the child to the mother; and admitting it is possible, and only possible, to save the former, let us inquire into the risk to which the latter is exposed, in the attempt to accomplish this object. The very nature of the case implies an unusual degree of pressure on the soft parts between

* Rigby's Midwifery, p. 142.

† On this point, I am much more disposed to agree with Dr. Meigs, who remarks—"One of the most dangerous errors relative to the forceps that a student could take up, would be the opinion that the forceps is a compressive instrument by its very design: it is not so—it is an extractor—it is a *tire tête;* and I think it ought to be established as a principle in obstetrics, that where there is not space enough for the descent of the head without the forceps, there cannot be produced a due proportion by merely squeezing the head down to the required dimensions by such an instrument."—Meigs' Philadelphia Practice of Midwifery, p. 295.

the head and the pelvis; congestion must be the result; and if inflammation have not already taken place, the passages are in such a state that inflammation could be most easily excited. The blades of the best contrived forceps cannot be applied to the head when it is tightly impacted in the pelvis, without bruising the soft parts to a certain extent. This contusion becomes a centre around which inflammation takes place, may increase to any extent, and terminate either in a local slough of the compressed part, or a general gangrene of the vagina, if the inflammation assume an erysipelatous type. In the former case, the separation of the slough may be the formation of vesico-vaginal fistula. In the latter, death may be the result. You will admit that such consequences are of too grave a nature to hazard for the *slight chance* of saving the child, and therefore, when you are placed in the unpleasant alternative, either to save the child at the risk of the mother's life, or to sacrifice the child in order to preserve her, you must adopt the maxim which governs British midwifery, and consider the safety of the mother to be your first object. But you will seldom be placed in such a dilemma, if you observe closely a case of this description. If you are satisfied that the forceps cannot be safely introduced; if you think that you cannot compress the head sufficiently to extract it without exposing your patient to a tremendous hazard; it does not follow that you must destroy the child in order to deliver her. In the great majority of such cases, nature provides against the difficulty of the case by doing so herself. When the head is thus wedged, the liquor amnii discharged, and the uterus strongly contracted about the body of the child, it is seldom saved from the effect of this extreme pressure; its death is the result; and if the case be left altogether to itself, the child becomes putrid, the bones of the head looser and more compressible, and thus it is possible that it might be expelled by the uterus. Formerly, it was customary to wait for "these signs of the death of the child" before perforating, but being those of putrescency, the patient was exposed to all the consequences that would follow decomposition of its tissues in the uterus, and hence the death of the mother was too often the result. But now we have it in our power to ascertain its death by another means, which is available long before putrescency takes place. The stethoscope has been found to be a valuable aid to the obstetrician; it sometimes enables him to determine the

existence of pregnancy when all other means fail; but I know of no case where it is of more important service than in that which is before us, nor is there any in which its evidence is more certain. In pregnancy, when the child is small, the liquor amnii abundant, or the muscles of the abdomen strong, the fœtal heart may not be heard; but in parturition, when the liquor amnii is discharged, the child full grown, and perhaps large, the muscles of the abdomen stretched to their fullest extent, its pulsations are perfectly audible; and if once heard, there can be no change in the situation of the sound, because the child is fixed in its position. A close attention, therefore, to the fœtal pulsations, is necessary in such a case; and when they rapidly increase in frequency, then intermit, again return more feebly, and ultimately cease, you can have no doubt the death of the child has taken place. To prove to you the value of the evidence in this way obtained, I shall quote the very important experience of Dr. Collins as to these kinds of labours. He says—"I have no difficulty in stating, and *that after the most anxious and minute attention to this point*, that where the patient has been properly treated from the commencement of her labour, where strict attention has been paid to keep her cool and her mind easy, where stimulants of all kinds have been prohibited, and the necessary attention paid to the state of her bowels and bladder, that, under such management, *the death of the child takes place, in laborious and difficult labour, before the symptoms become so alarming as to cause any experienced physician to lessen the head.* This is a fact I have ascertained beyond all doubt by the stethoscope, the use of which has exhibited to me the great errors I committed before I was acquainted with its application to midwifery—viz., *in delaying delivery often, I have no doubt, so as to render the result precarious in the extreme, and in some cases even fatal.*"* This observation of Dr. Collins would apply to many cases of perforation that are recorded, and which have been followed by such frightful consequences that it is not surprising that they should excite the disgust of the profession. They were cases where the operation was useless, because performed too late. By means of the stethoscope it is in your power to prevent this, and to deliver the child in sufficient time to save the mother from injury. No one is justified in destroying a living child, unless there is clear evidence, from the symptoms, that the mother is in

* Collins's Practical Treatise, p. 16.

danger. According to the old rule of practice, therefore, you were placed in the dilemma, either to wait for such symptoms, or for the signs of putrefaction in the child—alternatives equally dangerous to her; but if the death of the child can be known the moment it takes place, and if it be true that its death precedes those dangerous symptoms, it is obvious that its removal by the crotchet is no longer objectionable, and perforation is deprived of all its horrors. So far as the safety of the mother and the preservation of the passages from injury are concerned, there is no comparison between perforation and the forceps. In this respect perforation is a far safer operation, if ordinary caution be exercised; the objection—the sole objection that condemns it, is the fact that the child must be destroyed, either by the uterus, or by the instrument. We freely admit the cogency of the argument; but when it is weighed against the still greater objection, that in the attempt to save the child, the soft parts of the mother may be injured to a most dangerous extent, while the preservation of the child is extremely doubtful,—when we find, in the imperfect history of these operations, such as they are given to us, that the child is very generally lost, or, if there be an exception in which the child is with difficulty saved, the case is recorded with that triumphant acclamation that proves the success to be unexpected, —when the risk to the mother is so great, and the prospective advantage so doubtful, you will admit that the balance is in favour of an operation by which, if properly performed, and with sufficient promptitude, the safety of the mother is at least secured.

We are not generally favoured with a faithful history of cases that illustrate the mischievous effects produced by the forceps. On the contrary, while the post-partum accidents of a skilful operation are deeply concealed in the shadows of the back ground of the picture, the surprising, the almost miraculous, power of the instrument is put prominently forward, with all the vividness of a most glowing and high-coloured description. Thus the truth is concealed from you, and so would remain, until exposed by your own dear-bought experience, except that you find scattered through the works of men whose skill is acknowledged, ominous hints and anxious warnings against the improper application of these instruments. Many evidences might be quoted to this effect: we shall direct your attention to a few of them. Your late respected professor, Dr. Davis, paid a great deal of attention

to the subject of instrumental labours, and was disposed to advocate a much bolder use of the forceps than what I should recommend; nevertheless, he candidly admits, that "of all the instruments used in the practice of midwifery, those of the present class [the forceps] are unquestionably *the most dangerous to the mother,* inasmuch as in all cases where the forceps are used, the maternal tissues are more or less liable to contusion. All the fangs and framework of the instrument are made of tempered steel, and let them be ever so well covered and defended, they will still retain a great degree of hardness, calculated to bruise and to fret the soft and living texture which might be interposed between their covered surfaces and the solid walls of the pelvis."*

The same impression of mischief leads Dr. F. Ramsbotham to warn the practitioner that "cautiously and tenderly must this iron instrument be used! We must recollect that no sensation can be imparted to the operator's hand of any injury that may be done to the woman; and we must remember that one injudicious thrust, one forcible attempt at introduction, one violent effort at extraction, may bruise, may lacerate, may destroy!"† Dr. Blundell addresses his pupils thus—"When, however, you lay your hand upon the tractor, or forceps, remember, that the accoucheur who is meddlesome may be guilty of occasioning laceration of the perinæum, rupture of the vagina, compression and death of the child, inflammation of the abdomen of the mother, and many other fatal consequences, *which I myself have had occasion to see*—a list of offences surely sufficient to alarm the prudent."‡

But let us come to more direct evidence. Riecke, in his report of the practice of the kingdom of Wurtemburg, gives the results of a very large number of cases, and amongst them those in which the attempt was made unsuccessfully to remove the impacted head by the forceps. He observes—"Almost always, perforation was preceded by attempts to apply the forceps, and to the great injury of the mothers, because perforations, not preceded by such attempts, presented much more favourable results. . . . . The trials at extraction with the forceps—

* Davis's Obstetric Medicine, p. 786, 8vo. edition.

† Ramsbotham's Obstetric Medicine and Surgery, p. 299.

‡ Blundell, by Castle, p. 526.

which many accoucheurs continue, to the extinction of the infant's life (although foreseeing the necessity for perforation)—exhaust the mother to that degree, that she necessarily sinks under the effect of these violent efforts."* In allusion to similar inquiries Dr. Collins remarks—"It is from being thoroughly convinced of these facts by long and extensive observation, that I consider the forceps quite inapplicable when the head becomes fixed in the pelvis, and the ear cannot be reached by the finger except by violence, in consequence of disproportion existing between the head and the pelvis. . . . The results I have witnessed from such practice [delivery by the forceps] were most distressing: in some, the neck of the bladder or urethra either lacerated or the injury by pressure from the forceps so great as to produce sloughing and consequent incontinence of urine; in others, the recto-vaginal septum destroyed, either of which renders the sufferer miserable for life; and in two cases, where the mouth of the womb was imperfectly dilated, so much injury inflicted on this part as to terminate in death."† Dr. R. Lee, in his Lectures, quotes the paragraph at full length from which these passages are extracted, and adds—"The accuracy of these remarks is fully confirmed, by all the forceps cases which have come under my observation which exceed sixty in number."‡ It would occupy too much time

* Riecke, in his report, gives 84 cases of perforation, in 31 of which the mother died, being in a proportion rather more than one in three. He explains it thus:—

"Presque toujours la perforation du crâne avait été précédée de tentatives pour appliquer le forceps, et cela au détriment des mères: car les perforations non précédées de ces tentatives offrent des resultats *beaucoup plus favorables que les autres.* La répugnance des accoucheurs à pratiquer la perforation du crâne lorsque l'enfant est encore en vie est d'une influence très fâcheuse pour les mères. . . . Les tentatives d'extraction avec le forceps que beaucoup d'accoucheurs continuent *jusqu'à l'extinction de la vie d'enfant tout en prévoyant la nécessité de la perforation du crâne épuisent les mères au point qu'elles succombent presque nécessairement à la suite de ces efforts violens.* Les suites ne sont pas moins fâcheuses lorsque l'accoucheur se décide à attendre patiemment que l'enfant soit mort.[1] La perforation du crâne exécutée avec les précautions convenables n'est pas en elle même une opération bien dangereuse. Parmi les femmes soumises à cette operation il s'en est trouvé une qui l'a subie dans onze accouchemens consécutifs et jamais elle n'en a éprouvé de suites fâcheuses."—*Archives Médicales*, tom. xxii. p. 375.

† Collins's Practical Treatise, p. 12–13. ‡ Lee's Lectures, p. 305.

[1] The means of determining the death of the child by the stethoscope is not alluded to by Riecke.

to accumulate further tesimony to the same effect.* I trust sufficient has been placed before you to authorize the conclusions at which I have arrived, and which are now submitted to you—viz., that when the head is impacted in the pelvic cavity, it cannot be delivered by the forceps without such injury to the passages as might endanger the mother's life; that the probability of preserving the child's life is not sufficiently certain to justify an attempt which might be so hazardous; that in the great majority of these cases the death of the child takes place naturally, and it may be removed before symptoms dangerous to the mother present themselves; and lastly, that if it should happen that the reverse occurs, and danger to the mother—whether from exhaustion or extending inflammation—is indicated before the death of the child, that then perforation is called for, rather than render the risk to the mother a certainty, by the dangers that result from a forcible extraction by the forceps.

We have been obliged to dwell at some length on these disputed questions connected with the practice of midwifery, when the head is fixed in the cavity of the pelvis; we shall therefore only allude very briefly to the last stage of delay, when—

The head is retarded at the outlet.—When the head is in this position, it may arise from the perinæum being rigid, or from the arch of the pubis being too narrow, so that the head cannot pass out between the ischio-pubic rami. In either case, there is a long-continued pressure on the perinæum, which must excite inflammation, and increase its rigidity, if the delivery of the head be not assisted. The strictest attention is necessary to subdue any tendency to inflammation in the perinæum; fomentations must be sedulously employed, and, if necessary, depletion by leeches. By this means a rigid perinæum will in many instances gradually yield to the head, and allow it to pass; but sometimes the vectis may be passed on the pubic side of the head, to assist its advance. Great caution is required not to bring the head down too suddenly on the perinæum, which must also be protected by the

* "I wish that my present subject permitted me also to state what I have found on dissecting the parts after the use of the crotchet, and, *in particular, where the forceps had been used,* as I must presume, in a case improper for them. The injury which the seemingly harmless instrument—the forceps, is capable of doing, might then be proved, and a wholesome admonition given to young surgeons."—Sir Charles Bell on the Muscularity of the Uterus; *Medico-Chirurgical Transactions,* vol. iv. p. 339.

counter-pressure of the hand. Where the difficulty arises from narrowness of the pubic arch, the forceps is preferable, both because you have more power to overcome the resistance of the tubera ischii, and there is less danger of the pubic blade injuring the adjacent soft parts than if the vectis were employed, and much force used in the extraction.

ACCIDENTAL OBSTRUCTIONS are occasionally causes of difficulty in the second stage of labour, and when such are presented to your notice they always demand the most serious attention. First, because the majority of them depend upon some organic disease, the existence of which renders labour, if at all severe, extremely dangerous to the patient. Secondly, because the nature of the obstruction is often very obscure; and if a tumour impede the progress of the head, it may be doubtful whether it is ovarian, polypoid, or malignant. The extent of its attachments, and the possibility of removing it, may also be a difficulty. You have many reasons, therefore, for extreme caution and a very guarded prognosis under such circumstances. Tumours of this kind are, to a certain extent, moveable, and may be either soft and fluctuating, or firm and elastic. Sometimes the sacrum becomes the seat of osteo-sarcoma, and then a hard and perfectly unyielding tumour obstructs the head.

Beside these tumours, another description of obstacle is occasionally met with, the consequence of previously existing inflammation. Cases have been observed *where the os uteri has been agglutinated* in such a manner as altogether to prevent its dilatation. One case is recorded by Dr. Ashwell, in which the os uteri was absent; nor could the first stage proceed, until an artificial opening was made to allow the head to pass. These are, however, very rare cases; a more common effect is the alteration produced in the vagina. Sometimes *a band is found crossing the vagina* and preventing the advance of the head. *The walls of the vagina are occasionally united* for a certain distance, and, again, *a stricture may be formed in the vagina*, just as in the urethra. It is very necessary to make the most careful examination when a case of this kind presents itself, because the extent of the injury done is not always confined to the part which obstructs the head; partial sloughs of the vagina are just as likely to be the result of the previous inflammation, and when these have separated, the portions that have been thus partially destroyed must have been

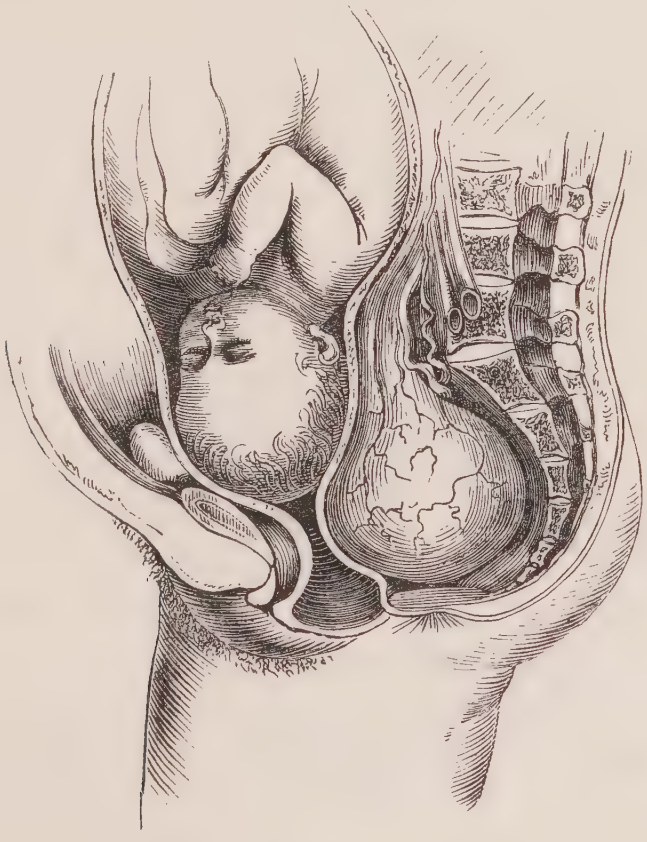
left extremely thin, and badly calculated to resist any extreme pressure. Thus the vagina may be very easily lacerated if labour is suffered to continue for any great length of time.* When a band is formed in this manner, it may easily be divided by a guarded bistoury, and the obstruction removed; but when a stricture is the cause of difficulty, more care is necessary. The head should be pressed back in the interval of the pains, and the portion of the vagina above the stricture accurately examined; if it be of the usual strength and thickness, or if its density be increased, it is better to allow labour to proceed, in order that the head may gradually dilate the stricture; but if, on the contrary, the vagina be felt unusually thin, it would be extremely dangerous to do so, because the head may force its way through

* In a very interesting paper on this subject in the Dublin Journal, vol. xxiii., Dr. Doherty states some facts worthy of attention. He mentions one instance of a "slough of the entire inner surface of the vagina. From the vulva to the os uteri, not a point escaped; and to prove how care and attention can prevent ill-consequences, even in such a case as this, I would remark, that the patient who suffered this loss of substance, left the hospital with the passage almost as capacious as before delivery" (p. 67). In another case, where there was occlusion, "There was no *direct* communication between the vagina and uterus; an orifice *below* the occlusion admitted the finger into the cavity of the bladder, into which the os uteri could be felt to project, owing to the destruction of the vesico-vaginal septum also *above* the adhesion." This patient was not pregnant.

The advantage of nauseating doses of tartarised antimony in relaxing a rigid vagina, Dr. D. illustrates by the case of a middle-aged woman, who was admitted into the Dublin Lying-in Hospital in labour of her first child. "On examination, the finger could be passed up the vagina only with the greatest difficulty, and when introduced, felt as if it were surrounded by a cylinder of iron, so thick and hard were the walls of the canal and perinæum. They seemed in truth not to possess the slightest elasticity; so much so, indeed, that I was some time before I could persuade myself that it was not one of those hard, encysted tumours surrounding the rectum that my finger came in contact with. And yet all this rigidity disappeared in less than six hours, under the use of tartar emetic, and the child was expelled without any difficulty" (p. 69).

"While I deprecate the rashness of operating without a well-marked necessity, I would at the same time beg to dwell on the fatal consequences which may ensue from postponing the use of the knife beyond the moment at which it becomes necessary. Every additional instant then adds to the risk of laceration, and of course increases the chance of a lamentable termination to both mother and child; a fact which was forcibly impressed upon me by a case wherein the attendant, while sitting at the bed-side with the scalpel in his hand, delayed employing it, in order to afford another practitioner who was present, an opportunity of examining the part; *meanwhile a strong pain suddenly came on, and the vagina was extensively torn* (p. 72). In a case of face-presentation, a thick band surrounded the upper portion of the vagina. This band was nicked in one or two places, the pains continuing of natural strength and frequency; the face gradually descended, and as it progressed the remainder of the band appeared to relax, and every hope was entertained of a fortunate issue, till about two o'clock, P.M., when rupture took place" (p. 73).

the attenuated portion, and perhaps convert the rectum and vagina into one common cloaca. It would be preferable to divide the stricture in different places, so that it may yield to the head more readily. When the walls of the vagina cohere, the case becomes very embarrassing, because they must be separated; and yet there is a danger that the vagina may be cut through, if great caution be not exercised. You have also the additional difficulty, that it is almost impossible to ascertain the condition of the vagina behind the portion that is united. Some risk must therefore be encountered. It is better to allow the labour to proceed sufficiently far to determine the extent to which the head may separate the parts adherent, employing every necessary means to counteract any inflammation that may arise. The head may overcome the resistance to a certain extent, so as to render the division of the remaining portion much safer and more easy; but if this cannot be accomplished, the walls of the vagina must be dilated, so as to expose perfectly the adhesion which it is necessary to divide by cautious and frequently repeated incisions with the knife.



Ovarian Tumour.—Merriman.

Ovarian tumours sometimes descend into the pelvic cavity, and obstruct the head of the child. If the tumour consist of several

cysts, the smallest may pass down between the vagina and rectum; cases are also recorded where very large tumours are found in the same situation. One of these cases is given by Dr. Merriman, along with a very accurate drawing of the tumour. Their contents vary so very much in their consistence and density, that they are not always easily recognised; but if there be any sense of fluctuation, or even if the tumour be very elastic, the probability is, that it is an ovarian cyst, containing fluid more or less deeply seated. Unless the size be great, it is possible that the head may press the cyst against the sides of the pelvis, and pass below it; a small tumour also may be pushed back towards the brim of the pelvis, when the pains are absent, and perhaps be prevented from again descending when the action of the uterus returns; if by neither of these modes the removal of the obstacle can be accomplished, the only resource left is to puncture the tumour and allow the fluid to escape. This may be done, although there be no distinct sense of fluctuation, because the fluid is often thick, like honey, and may be deep-seated, which will communicate to the fingers an elastic feel rather than that of fluctuation. Besides, if a mistake be made, and you should puncture a polypus or a fibrous tumour, no great injury is done. It is when the sense of fluctuation is distinct that caution is required, especially if the tumour should appear towards the pubic side of the pelvis. The bladder has sometimes prolapsed before the head of the child, and presented a fluctuating tumour. It is not necessary to tell you that this should not be punctured. But the danger of these cases does not generally arise from the delivery being obstructed, but from the effect which labour produces on the disease; the tumour is necessarily exposed to a great deal of irritation; the patient is weakened if not exhausted by the struggle which takes place; and, when labour is concluded, she is quite unequal to combat the effects of that irritation. Dr. Merriman has collected the history of eighteen cases of ovarian tumours obstructing parturition. One half the mothers died, three recovered very imperfectly, and six only may be said to have escaped; sixteen of the children were still-born, and four were born alive. I shall quote from Dr. Merriman's work the results of these cases as he has given them, from which it appears that the greatest success attended those cases where the tumour was opened:—

"From the enumeration of the cases already referred to, it appears that

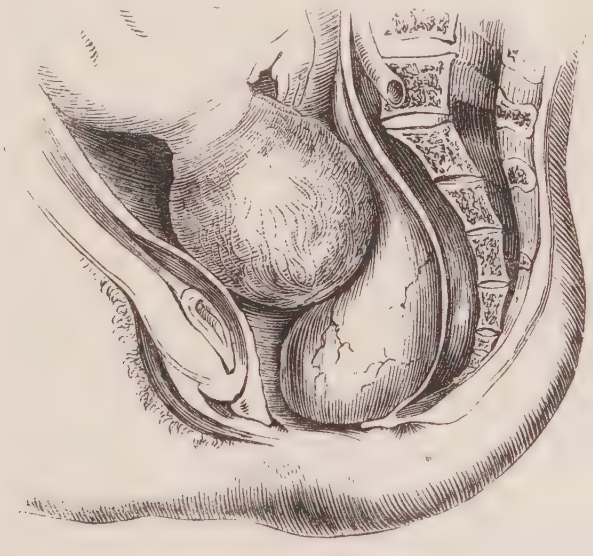
"Twice, the labour was effected by the pains, unassisted by the art of the accoucheur; but one of these women lost her life, and one of the children was still-born.

"Five times, the perforator was used after a longer or shorter duration of labour. Three of these women died, another recovered very imperfectly, and one got well.

"Five times, the labour was terminated by turning the child; all the children were lost, and only one mother recovered.

"Three times, the tumours having been opened, the labour was afterwards trusted to nature. Two of these women recovered, but the other remained for a long time in an ill state of health. Two only of the children were preserved. In three cases, the tumours being opened, it was still found necessary to have recourse to the perforator. One of these women died, one remained in an ill state of health for eighteen months, and then sunk under her sufferings; the third recovered."

Dr. Merriman remarks, "Upon the whole, the evidence we at present possess is more in favour of opening tumours when they contain a fluid, than of any other mode of procedure, for of the nine women who recovered more or less perfectly, *five appear to owe their safety to this operation*, and of the children born alive, two were preserved by the same means."*



Polypus.—Ramsbotham.

Polypus has been found sometimes to interfere with delivery. An interesting case of this kind is given in Dr. F. Ramsbotham's

* Merriman on Difficult Parturition.

"Midwifery,"* in which the polypus nearly filled the pelvic cavity. However, "the mouth of the womb dilated rapidly, the membranes burst speedily, and in less than an hour after my [Dr. Ramsbotham's] arrival, the head, under the action of powerful throes, forced the principal bulk of the tumour external to the vulva (which still, nevertheless, retained its attachment to the uterus by the stem), and itself instantly followed." † Thus it is possible that a moveable tumour of this kind, although very large, may be driven down before the head. If it be small, and detected early in labour, it might also be in your power to prevent the tumour descending. It might be pressed back when the pain ceases, and so retained until the head passes beyond it. But if neither can be accomplished, if the tumour remain an impassable barrier, it should be removed, not by ligature, but by excision; the polypus should be drawn down as much as possible by a forceps proper for the purpose, a temporary ligature applied, and the stem cut through.

We shall not here enter into a discussion of the comparative merits of the treatment of polypus by ligature and by excision; this must be reserved for another opportunity. But in reference to the present case, we would only observe that the risk of dangerous hæmorrhage after excision is not so great as to justify the adoption of the only alternative—destroying the child. You will have little difficulty in recognizing polypus when it descends so low into the vagina as to interfere with labour. Beside the firm, fleshy feel of the tumour, it is extremely moveable, and when the head is pressed back in the interval of the pains, its pyriform shape and long narrow stem will be more obvious. It is not likely that the ovum could be brought to maturity if a large polypus occupied the cavity of the uterus; it is, therefore, fair to assume, that when a polypus is found to impede parturition, it must be attached to the mouth of the uterus, and therefore it can be the more easily traced to its origin, so that you have every facility to assist your diagnosis.

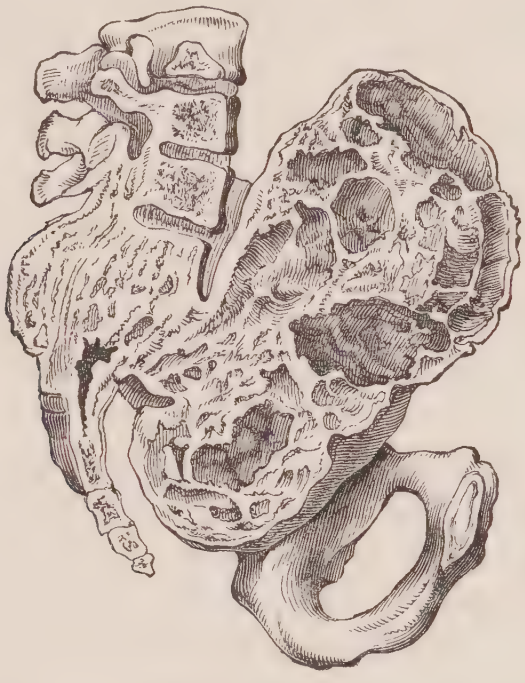
Another cause of obstruction may arise from a fibrous tumour of the uterus. A remarkable and very interesting case of this kind is recorded by Dr. Beatty,‡ in which the tumour was so large

* Ramsbotham's Principles and Practice, etc., p. 237.

† Op. cit. p. 237-8.

‡ Dublin Medical Journal, vol. xvii. p. 411.

and apparently so attached, as it was thought would render the Cæsarian section necessary. It was agreed, however, to wait, and to observe the action of the uterus, as long as it might be done with safety. After some time, and to the surprise of those in attendance, the tumour appeared to retreat from its situation, while the child began to occupy its place, and to present its foot: this was seized, and the delivery with great difficulty completed. The child was still-born, but the mother recovered.



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Osteo-sarcoma.

OSTEO-SARCOMA sometimes grows from the sacrum. The bony tumour may be so large as to render delivery *per vias naturales* impossible, and therefore the Cæsarian section must be had recourse to. But it may be small enough to prevent this necessity, although it may be difficult to save the child. A case of this kind came under my own observation, where a tumour, about the size of an orange, was connected to the middle of the sacrum; it was perfectly immovable, and of bony hardness; the head of the child could not pass it, nor was there the least hope that it could be drawn by the forceps through the narrow space left in the pelvic cavity; the head was therefore perforated, and the child removed: the mother perfectly recovered.

Beside these more usual causes of obstruction to delivery, Dr. Drew had detailed, many years ago,* two very remarkable cases of tumours in the pelvis. The first patient, who was not pregnant,

* Edinburgh Medical and Surgical Journal, vol. i. 1805, p. 20.

died in consequence of it. An examination was made after death; there seemed to grow from the left sacro-sciatic ligament a tumour, which "was perfectly round, about sixteen inches in circumference, of a fat, gristly substance, without any appearance of circulation in it." The root seemed to be its principal attachment, because when that was cut through it came away quite easily. The result of this inspection satisfied Dr. Drew of the practicability of removing it by operation; and, although a rare variety of tumour, it so happened that very soon after (as is often the case) a similar tumour came under his notice when the patient was in labour.

Dr. Drew states, "It was exactly the same. The tumour grew out of the right side, and occupied the whole cavity of the pelvis so completely as to admit of passing only one finger between it and the pubes, by which I could scarcely reach the head of the child." Dr. Drew proposed to remove it, which was assented to. An incision was made through the perinæum, at the right side; the tumour was exposed, the finger passed before and behind its root, which was easily divided with a knife, and brought away. The wound being dressed, labour proceeded, and in six hours, the head being within reach of the forceps, was delivered safely. The patient recovered rapidly. These rare cases may present themselves: if such should happen, you have sufficient encouragement not to despair altogether of giving relief.

We have now concluded the consideration of difficult labours, so far as their causes, symptoms, and general treatment, are concerned. We have directed your attention to cases where the aid of the vectis, the forceps, or the perforator, is called for. It remains to us, therefore, to consider the mode of applying these instruments.

LECTURE XI.

OBSTETRIC OPERATIONS.—THE FORCEPS.

Instruments employed for preserving the Lives of the Mother and the Child—The Vectis—Of limited Application—Mr. Gaitskill's manner of using it—Proposed mode of Operation—Objection to use it as a Lever—The Forceps—Operation with the Short Forceps when the Head is resting on the Perinæum—Operation when the Head is in the Pelvic Cavity—Operation when the Head is fixed in the Brim of the Pelvis.

In the three preceding lectures, we endeavoured to point out to you the situations at which the head may be impeded in its progress through the pelvis, and the varieties in the degree to which it may be compressed; we were also desirous to place before you the evidence upon which the conclusions therein stated were founded, in reference to disputed questions as to the rule of practice in certain cases of difficult labour. Turning from those controversial subjects, and, leaving the questions when instrumental aid is called for, and what kind of instruments should be employed, your attention must now be directed to an equally important subject—obstetric operations.

The instruments employed in operative midwifery may be arranged into three classes. 1st. Those calculated to preserve the lives both of mother and child, as *the vectis*, *the forceps*. *The fillet* was formerly used for the same purpose, but is now discarded from practice. 2nd. When the preservation of both lives is impossible, those intended to preserve the life of the mother by sacrificing the child. These include, *the perforator and crotchet*, *the craniotomy forceps*, *the osteotomist*, *the cephalotribe*. 3rd. When the delivery of the child cannot be effected even by such means, and the safety of the mother is more than doubtful, there still remains the operation of opening the uterus through the abdomen, and

thus removing the child, with some chance, at least, that it may survive.

The rules, therefore, which govern the application of instruments, are founded upon these three principles:—1st, *to preserve the lives of the mother and the child;* if this be doubtful, 2nd, *to preserve the life of the mother, without reference to the child;* and when this cannot be done, or, at least, seems so from the circumstances, 3rd, *to save the child, if possible.*

The *vectis* and *forceps* belong to the first class. The vectis consists of a single blade, shaped like a blade of the forceps, only more abruptly curved, and when used in the manner we have recommended, it is intended to act as an extractor, to assist the feeble action of the uterus, to correct malpositions of the head, or to overcome any unusual resistance of the perinæum. It is not, therefore, an instrument of much power, and its use is limited to the removal of slight impediments to the passage of the head. The advocates for this instrument do not, however, confine themselves to such a restricted application. They employ it as a substitute for the forceps, and even claim for it a superiority over the long forceps, in those cases in which the head is arrested in the brim of the pelvis. We must dissent from such a view of the utility of the vectis: in order to give to it the same power which the forceps acquires by the counter-pressure of the blades, an amount of force must be employed which might be very dangerous to the patient. Imagine the head fixed in the brim of the pelvis, the vectis applied to the occiput, the practitioner using all his strength to extract, and at the same time to keep the vectis in its position, and the instrument slipping from its situation into the vagina; by supposing such a case, you can readily understand our objection. Nevertheless, as the operation of delivery by the vectis at the brim of the pelvis has received the support of Dr. Blundell, who recommends the instrument improved by Mr. Gaitskill, and his mode of using it, we shall briefly quote Mr. Gaitskill's rules for applying it in such cases.

After giving directions as to placing the patient, etc., he proceeds, "The preliminaries being settled, the next thing is, the safe introduction of the instrument. To do this with facility and safety, the accoucheur should kneel on a pillow by the side of the bed, and introduce all the fingers into the vagina as far as the brim of the pelvis, at the side of the sacral promontory (either right or

left, according to the situation of the occiput); as he passes up the instrument the fingers should be gradually withdrawn. The instrument is to be pressed up into the cavity of the uterus, being careful that it is in the inside and not on the outside, gliding it over the parietal bone till the screw part of the handle presses on the fourchette of the os externum. This attained, the handle should now be held firmly in the right hand, while the index and middle finger of the left, fixed about two inches from the screw part within the vagina, become a fulcrum. On this fulcrum, or point of support, the instrument is made to move from the sacro-iliac symphysis towards the hollow of the ilium, by the action of the right hand on the handle. In this way it describes the section of a circle, and glides on the occiput. Should the occiput point to the right ilium, the left hand must be employed; if to the left ilium, the right hand must be used. When a labour pain takes place, the accoucheur should gently aid it by drawing down in the line of the axis of the pelvis—i. e., an imaginary line, directed from the umbilicus through the centre of the axis of the pelvis. In this way the occiput is depressed, while the chin approaches the child's breast, and its head is reduced to the smallest compass, and is thus enabled to pass through the cavity of the pelvis. As soon as the occiput is brought so low as to press on the perinæum, the instrument should be withdrawn, and re-introduced with the usual precautions. The object now in view is, to place the instrument over the face of the child. To effect this, the hand must be passed up, as at first directed, to the right or left sacro-iliac symphysis, according to the situation of the face. When the instrument gets above the brim of the pelvis, a finger or two must be inserted by the side of the instrument, and pressed on till it (the instrument) passes over the forehead on to the face, so as to embrace the chin. An imaginary line drawn through the centre of the child's mouth, ear, and occiput, is the present situation of the instrument, and quite the reverse of what it was before. The practitioner has now nothing to do but to draw down during the time of pain, increasing the power according to the degree of resistance." *

Such is the mode in which Mr. Gaitskill applied it when the head was high up within the cavity, or in the brim of the pelvis; but we confess our fears to recommend to you such a manner of

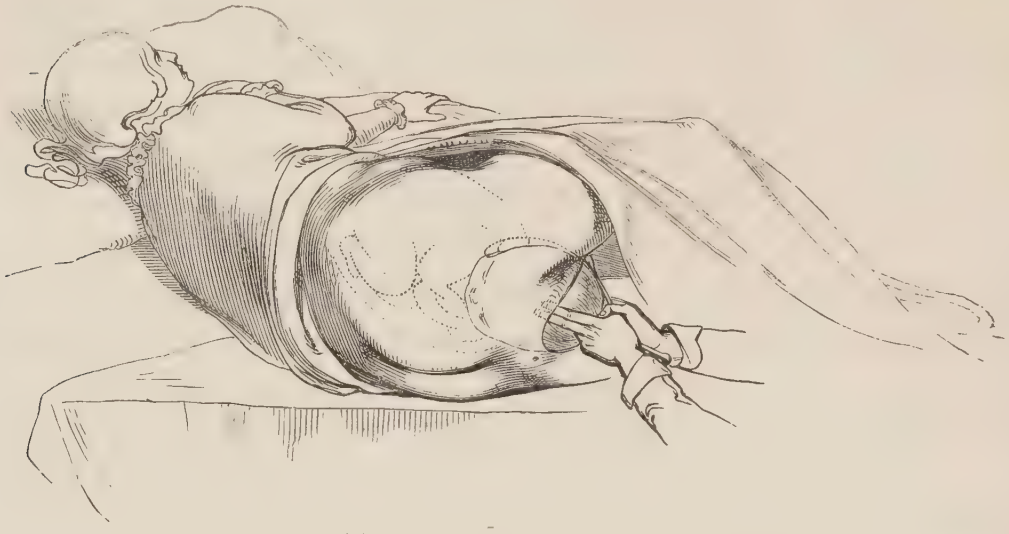
* London Medical Repository, 1823, p. 379—381.

employing the vectis. The cases in which it may be used with most advantage, are those in which the head is arrested at the outlet, in consequence of the uterus being unable to overcome the resistance of the perinæum. So long as the pains continue with any regularity and strength, you should not interfere, except for the purpose of preventing inflammation; but when the pains become feeble, suspended, or return at long and irregular intervals, then the vectis may be applied with even more advantage than the forceps, because there is less risk of injuring the perinæum. We shall proceed to describe to you the manner of performing such an operation.

You must first observe those preliminary measures necessary in all obstetric operations. The urine should be withdrawn from the bladder by an elastic gum catheter, of rather a large size (No. 10), and without a stilette. It is always safer to use a catheter of this kind, because there is less risk of injuring the urethra, if it should be compressed, than if the unyielding silver catheter were employed. An enema should also be administered, to relieve the large intestines: and when these points are secured, the patient, lying on her left side, should be drawn as near to the edge of the bedstead as possible. The pelvis must be raised more than usual, and if the patient has been lying on a bed, and not on a mattress, it would be advisable to place a hair cushion under the hips. Adopting Mr. Gaitskill's position, you may kneel with one knee on a pillow, and in the interval of the pains, introduce the first two fingers of the right hand between the head and the symphysis pubis: passing them on either side of the symphysis, the tip of the ear will be felt without difficulty: the finger must remain applied to it while the vectis is being introduced: the instrument should be held about the middle, between the two forefingers and thumb of the left hand, and the handle directed obliquely downwards and backwards towards the coccyx, in order that the blade may lie flat upon the head when the instrument is passing between it and the fingers of the right hand. This is difficult to do when the vectis is very abruptly curved, and therefore the curvature of the blade makes a very essential difference in the value of the instrument. If too much curved, it cannot easily be applied; if too gradually curved, like the forceps, it will slip from its position if any force be used in extraction. You must, therefore,

attend to this point particularly, in the selection of the instrument you use. When the blade is so applied, press it gently forwards with a slightly oscillating motion, until the edge reaches the ear, which is now placed exactly between the finger and the vectis. The handle must, therefore, be depressed still more, in order that the edge may pass over the ear; when this is safely accomplished, the finger may be withdrawn, and the vectis passed forwards to its proper position. The direction of the handle is now completely altered, and looks downwards and forwards, its junction with the blade corresponding nearly to the sub-pubic ligament. When the instrument is thus applied, "then (in the language of Dr. Denman), grasping the handle of the instrument firmly in the right hand, wait for the accession of a pain," which, although absent before, almost always returns when this new irritation is applied to the uterus. While you assist the pain at this stage of the operation, great caution is required. It is here that the mischievous principle of the action of the instrument, as a lever, may do so much injury. If the pubis, or ischio-pubic ramus be made the fulcrum, the soft parts must be contused, and a slough may be the result. If, to avoid this, the fingers of the left hand press the blade strongly against the head, and thus guard the soft parts from pressure, making, as it is said, a fulcrum of the fingers, the lever is only altered from one of the first order to one of the second. In the first, the pubis is the fulcrum. In the second, the head and face of the child. Serious injury may be done in either case. You should, therefore, carefully avoid using the vectis as a lever; and in order to do this the more certainly, it is better to pass two fingers of the left hand between the head and the perinæum, and to grasp the shank of the instrument with the remaining fingers; counter-pressure is thus made similar to the forceps, and the vectis may be used solely as a tractor. Again, in the language of Denman, we would say, "When the pain ceases, let the instrument rest, and on its return, repeat the same kind of action, alternately resting and acting, in imitation of the manner of the pains." Proceeding thus cautiously, the head will soon advance and press strongly on the perinæum. The introduced fingers may then be withdrawn, and the vectis maintained in its position, rather for the purpose of acting with it, if the pains should again become feeble, than to

extract the head by its means, if the uterus be sufficient to expel it; thus the perinæum will be better secured from injury.



Extraction with Vectis.*

When *the vectis is used to correct mal-positions of the head*, it is better not to use one too much curved; one blade of the forceps will often answer in these cases; the head is higher in the pelvic cavity, and does not generally press on the perinæum; too great a curvature would interfere with its introduction; while, on the other hand, there is seldom occasion to use it as an extractor, because, when once the correction is made, the head will readily descend without assistance. Independently of its limited power, the vectis is liable to some disadvantages from which the forceps is free, and which should be guarded against. It is necessary to grasp the instrument very firmly, and sometimes to exert your strength to keep it in its place. Sometimes the vectis will not retain the head so securely that the instrument may not slip, and though it is easily replaced, still a good deal of force is necessary to keep it in its position. If, in such a case, the handle be smooth and round, there is also a risk that it may turn in the hand without your knowledge, and therefore do mischief. The handle should always be made rough, and with one side, at least, flat.

The forceps is more generally used in the practice of midwifery, and is an instrument of much more extensive application. It may be employed when the head is at the outlet, in the cavity, or in the brim, of the pelvis. Hence you will find, in obstetric authors, two kinds of forceps spoken of—the long and the short forceps.

* In these sketches the perinæum, etc., is exposed, to shew the position of the head, which is faintly outlined.

It is necessary to bear in mind this distinction, because the mode of operating with the latter is not the same as with the former instrument. This is the more important, because there seems to be some degree of confusion in the description given by authors of operations with the long forceps. For instance, when the head is arrested high in the cavity of the pelvis, a longer forceps is required than when it is at the outlet. The former operation is therefore sometimes mentioned as a delivery by the long forceps. In speaking of these operations, we would wish to be understood to mean, not only a different kind of instrument, but a different mode of applying it from that adopted when the short forceps is used. In order to avoid this confusion, we shall describe the operations required in three different cases: first, *when the head is resting on the perinæum*, the operation with the short forceps; secondly, *when it is arrested in the pelvic cavity*, which might be considered an intermediate operation. And, lastly, the operation with the long forceps, *when the head is fixed in the brim of the pelvis.*

Passing of the Pubic Blade.

The operation, when the head is resting on the perinæum, may be undertaken in cases similar to those in which the vectis is employed, and is preferable, if there be any diminution in the transverse measurement of the outlet. The preliminary steps of this operation are the same as for the vectis; but it must be remembered, that the temperature of these, as well as of all obstetric instruments, should be raised to that of the vagina, and they

should be greased before being introduced into the passages. Having made these previous arrangements, the pubic blade of the forceps, with the lock looking upwards, must be passed over the head in a similar manner to the vectis, and when so placed, the handle may be raised towards the pubis, and there maintained by an assistant *in its exact position.* The handle should not be moved to the right or left side, because it is of great importance to observe the precise direction of the pubic blade when the sacral blade is being introduced. Taking, then, the lock of the former as your guide, as soon as the pain ceases, pass two fingers of the left hand between the head and the perinæum, and holding the sacral blade lightly by the handle with the right hand, endeavour to guide it so along the introduced fingers that the edge of the sacral may pass along the lock of the pubic blade. As the sacral blade passes forwards, and the locks approach each other, the handle of the pubic blade should be taken in the left hand, and drawn slowly towards the perinæum. In this manner the locks will glide together, and the instrument be applied without much difficulty.

Introduction of Sacral Blade.

When this is done, and the pains return, the handle of the forceps should be held firmly, and, the perinæum being supported at the same time by an assistant, traction made—at first, very moderately, carefully observing the action of the uterus; and as you perceive that the pains are inefficient, the force may be increased. With each effort the handle may be drawn, first, with a slightly waving motion to either side, and then upward, towards

the pubis, in order that the head may pass in the axis of the vagina. When the head advances, and you are satisfied that the difficulty is overcome, it is better to leave the rest to the uterus so long as it acts, because there is less risk of injury to the perinæum. For the same reason, it would be advisable to unlock the forceps, and to withdraw the sacral blade, leaving the pubic to be made use of as a vectis. When the perinæum is tightly stretched over the blade of the forceps, passing out with the head of the child, it is very easily lacerated. The time that the operation occupies is of no importance. The object you should have in view, is to assist the action of the uterus, not to anticipate the pains, or to hurry the delivery. Thus a considerable time may elapse before the operation is concluded. Be careful, therefore, not to make unguarded promises of prompt relief.

The forceps used in this operation is altogether shorter than that employed in either of the other operations. It is about nine or ten inches long; the distance between the extremities of the blades is about one inch and a half; that between the centre, about three inches. The intention is to prevent the head of the child being much compressed in the effort to extract it. There is some difference, however, in the construction of these instruments, which will be understood by the examples placed before you. The short forceps of Dr. Denman* had the extremities of the blades closer, but the handles were very short, with the same object, that of preventing much compression. The short forceps of Dr. Conquest† has the fenestræ wide, in order that parietal prominences may pass through them. Dr. Aitken's and Dr. Collins's‡ are very similar in shape, and correspond with the description we have just given, only that Dr. Aitken's has a small moveable roller between the handles, to prevent compression.

The operation, when the head is arrested in the pelvic cavity, is one which requires a much more attentive consideration, because it is here that the difference in the practice of the most experienced accoucheurs is so remarkable. We have already submitted to you our reasons for the rules proposed for your adoption. They are, 1st, Not to interfere, or to apply the forceps, *if the head be slowly advancing*, unless it should happen that dangerous constitutional symptoms are approaching. 2ndly, Not to

* (Vide fig. 3, p. 227.) † (Vide fig. 5, p. 227.) ‡ (Vide fig. 4, 6, p. 227.)

apply the forceps *when the head is impacted.* The view of the operation which we wished you to take would confine it to cases of arrest. It is of importance, therefore, to make a very careful examination, *per vaginam*, before the delivery is determined upon. *First, to ascertain that the head is arrested.* Sometimes it ceases to advance, while the tumour on the presenting part increasing, is mistaken for its further descent. Both fingers, therefore, should be introduced, and passed high up, between the head and pelvis, in the interval of the pains, to determine the arrest. *Secondly, you should decide on the degree of disproportion.* In cases of arrest, the ear can generally be felt, which cannot be done without great difficulty in cases of impaction. Hence, *as a general rule*, to feel the ear is a diagnostic mark of this distinction; but you should not confine your attention to this point alone, because it sometimes happens that when the head is arrested, it is so placed that the ear cannot be felt, especially if the head be lengthened, and a tumour be formed upon it. The object of the rule is to determine the amount of space there is for the introduction of the instrument. Therefore, if the ear be out of reach, while the fingers can be passed with facility between the head and the pelvis—if the catheter can be passed easily—if you can press the head back without difficulty—and if the vagina be not swollen from the extreme pressure—then the forceps may be applied. *Thirdly, you must decide upon the time of its application.* It appears to me that *four hours* would be quite sufficient to allow the head to remain in the same position, to authorise your interference. But if there be the least indication of pain, swelling, or heat in the passages, you should not delay one moment from the time that these symptoms present themselves, when you are satisfied that the forceps may be applied. Promptitude is the secret of success, and in nothing is it more evident than in the case we are supposing. It is possible the pains may be strong and frequent, and it is generally a safe recommendation not to interfere so long as the uterus seems to have sufficient power, but rather to wait until the pains become feeble, or the action of the uterus is suspended. Nevertheless, in the case before us, you cannot act upon such a rule. If the head be arrested—if the pains be strong but inefficient — if inflammation set in — to hesitate to deliver must be considered the most mischievous vacillation. Every hour spent in these useless efforts of the uterus,

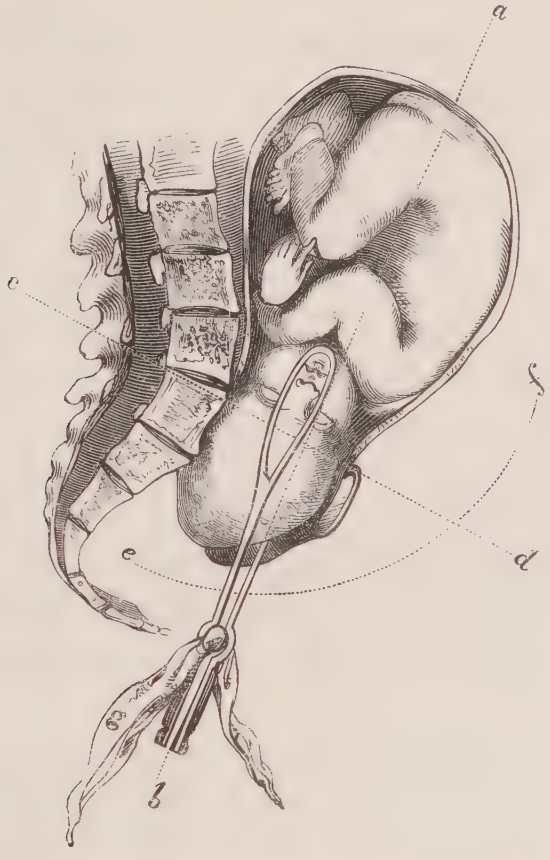
only increases your difficulty—only renders the operation more hazardous—and diminishes your chances of success, because the application of the forceps to parts already inflamed must contuse them to a certain extent, and if so, the contusion will terminate in slough. Although agreeing with Dr. F. Ramsbotham in many of the principles of his practice, I find myself opposed to him on this question. The summary of symptoms which he gives to authorise the use of the forceps, when labour does not continue twenty-four hours, seems to me to be founded upon a principle very hazardous to the safety of the mother. He states, "If, then, the pains are subsiding gradually, or have entirely disappeared; if the strength is failing, the spirits sinking, the countenance becoming anxious; if the pulse be one hundred and twenty, one hundred and thirty, one hundred and forty, in the minute, the tongue coated with white slime, or dry, brown, and raspy; if there have been two or three rigors; if, on pressing the abdomen, there is great tenderness of the uterus; if there be green discharge; if there be preternatural soreness of the vulva, with heat and tumefaction of the vagina; if the head have been *locked* for four hours, and made no progress for six or eight hours; if the patient be vomiting a dark, coffee-ground-like matter; if there be hurried breathing, delirium, or coldness of the extremities, *then we are warranted in having recourse to the forceps, although the labour have not lasted the limited period of twenty-four hours, or even twelve;* and we should be acting injudiciously to allow the case to proceed until the last four symptoms appear, without relief being offered."* Dr. F. Ramsbotham enumerates these symptoms, to authorise the delivery of the locked or impacted head—a case in which I have already stated that I do not think the forceps can be at all safely employed; but to apply the instrument when inflammation has advanced to such an extent as to engage the constitution in an irritative fever, and only to deliver before the last four symptoms of exhaustion appear, and that, too, when the head is impacted, seems to me to be dangerous in the extreme. I am the more anxious, therefore, to impress upon you the importance of not waiting, or withholding your assistance, the moment such symptoms commence; but if, unfortunately, it should happen that they have advanced to the degree so well described by Dr. Ramsbotham, then the

* Ramsbotham's Ob. Med., p. 313 and 314.

safety of the mother must be your first consideration, and you should select the operation that will best secure it. With this view, I again repeat, perforation is your only resource, although I admit it to be a very painful alternative. When you have determined upon the necessity for delivery by the forceps, and the time for performing the operation, the same preliminary arrangement should be made as in the former instance, using still greater caution in your antiphlogistic measures. Hence, if the vagina be swollen and hot, the urine retained, the pulse quick, depletion, some time before operating, would be advisable, the urine being, of course, removed. If the ear be felt, the pubic blade may be passed in the same manner as in the preceding operation, but if not, the presentation must be carefully examined. You can usually trace the lambdoid suture passing upwards from the posterior fontanelle; direct the pubic blade along this, and it will guide it to the ear. You may also take the rule, with regard to the pelvis, laid down by Dr. Rigby, and introduce the first blade behind the trochanter, still bearing in mind its relation to the lambdoid suture: thus the first step of the operation can be generally taken successfully. The passage of the sacral blade is rather more difficult. It may be introduced in the same manner as in the former instance, but its advance is frequently checked as it approaches the brim of the pelvis. If such should happen, be very careful not to use force in pressing it forwards. It is better to act with the pubic blade, for a short time, as a vectis, and if the head advance even slightly, the opposite blade will frequently glide into its place.

When the forceps is applied, it is well to dislodge the head from its situation in the first instance, because it constantly happens that in these cases of arrest some accidental displacement of the head is the cause of difficulty, which the uterus cannot alter; but when the head is relieved, it will glide into the correct position, and may be delivered without difficulty. If, however, you find that with the following pain the head is still arrested, the forceps must be seized firmly, and, in order to secure your hold, a coarse napkin might be placed loosely round the handles. A steady and powerful traction should be maintained so long as the pain continues, and when it ceases, the grasp of the instrument must be at once released, and remain so until the succeeding pain, when the same steady traction may be renewed. Thus you will

generally succeed in bringing the head through the opposing part of the pelvis, and as it advances more easily and approaches the perinæum, again recollect to leave it as much as possible to the efforts of the uterus. While the head is thus drawn through the pelvic cavity, you should bear in mind the direction in which it must pass; that when the forceps is in the axis of the pelvic cavity, the shank of the handles would lie between the tubera ischii, but when the head is in the hollow of the sacrum, the handles would then be directed forwards towards the pubis. You should therefore first draw, with a waving motion, directly towards you, and as the head advances, direct the handles forwards. It is necessary also to observe the rotation of the head in its lateral direction from the oblique towards the antero-posterior measurement of the pelvis. At the same time, it is advisable rather to follow than to guide the direction of the head in its progress, because, as it descends, it will *naturally* change its position, which might be prevented by the operator's awkwardness in holding the forceps, and attempting too hastily to turn it.



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Application of Dr. Radford's forceps when the head is fixed in the brim, etc.

The operation when the head is fixed in the brim of the pelvis differs from either of the preceding operations. The blades are

applied over the occiput and face of the child, and not over the ears. This may easily be done in the case to which we have confined this application of the forceps; but it would appear to us extremely difficult and dangerous to do so in other deformities of the brim of the pelvis. Two fingers, and as much as possible of the right hand, should be passed behind the trochanter, towards the centre of the ilium on the superior side of the pelvis, and if the anterior fontanelle be felt distinctly, the longer blade of the forceps (if they are unequal) should be passed over the fontanelle to the face of the child; the shorter blade may then be passed in the opposite direction over the occiput, guiding it by the lock of the introduced blade. When properly applied, the handles look downwards and backwards towards the perinæum, and in the axis of the brim ; traction must be made in this direction, and when the pain commences, the handles of the instrument should be held, as in the former case, firmly, and the force gradually increased, according to the resistance. Two or three steady trials will generally succeed in extricating the head from the brim, when it will rapidly advance without assistance; the forceps might be removed, but it is safer not to do so lest any impediment might delay its further progress.

It is necessary to remember the change in the direction of the head when it is passing into the hollow of the sacrum. The blades of the forceps might also be changed, so as to direct them over the ears of the child. Great caution is required in extracting the head from the brim of the pelvis, because it is impossible to use any force without compressing the handles strongly together. There is, therefore, danger lest the face of the child be bruised, or, what is quite as likely, the frontal bone bent in. In some cases, the edge of the blade of the forceps has been buried in the frontal bone, even when the instrument was intended to pass over both ears. Such a fatal accident would be much more likely to occur in this operation, if sufficient care were not taken to avoid it.

If the *posterior fontanelle* be felt on the superior side of the pelvis, the longer or facial blade of the forceps should be passed along the opposite side to the ilium, and then the occipital blade behind the trochanter, as in the former operation. The head of the child always lies in the transverse measurement of the brim, with the occipito-frontal axis corresponding to it. There are only

two positions, one with the face to the superior, and the second with the face to the inferior, side of the pelvis. The operation in the second case is, therefore, just the reverse of that in the first position.

In the construction of instruments, some forceps are made especially for this operation. It is considered objectionable (and I think justly so) to operate with a forceps that has the blades of equal lengths, because, when the instrument is applied, the occipital blade will prevent the facial passing sufficiently far over the face; its extremity may only reach the nasal bones, or be applied over the frontal sinuses, and therefore the bone might be crushed by the force employed in extraction. To avoid this, Dr. Davis has contrived a forceps with unequal blades, in such a manner that the curvature of the longer blade could be diminished or increased if necessary. More lately, Dr. Radford, of Manchester (who has had extensive experience in these cases of deformed pelvis), has invented a forceps with unequal blades for the same purpose (vide fig. 12, p. 229). The majority of practitioners, however, employ only one kind of forceps for these two operations, which they call the *long forceps*. Dr. F. Ramsbotham's long forceps (vide fig. 9, p. 229) has a shank between the handles and the blades, and is so curved as to adapt itself to the axis of the brim of the pelvis. Dr. Rigby has introduced Brüninghäusen's long forceps* (vide fig. 10, p. 229), an instrument somewhat longer than Dr. Ramsbotham's, having the second curve describing a larger circle. The lock between the handles also is differently constructed. The late Dr. Hamilton used a forceps about fourteen inches in length, with the second curve describing a smaller circle than that of Dr. Ramsbotham, but it is very clear that Dr. Hamilton never employed it in this operation (vide fig. 13, p. 231). Dr. R. Lee observes, "When Dr. Hamilton was in London, twelve or thirteen years ago, the use of *the long forceps* was one of the subjects of conversation which I had with him; and I was astonished when he informed me that he had entirely, for some time, laid aside the short forceps. On further inquiry, however, it appeared that in *no case did he ever use the long forceps until an ear could be felt.*" †

* "The most perfect lock is that of Professor Brüninghäusen of Würzburg, first introduced by ourselves into this country, and commonly known by the instrument-makers as Professor Naegele's forceps."—*Rigby*, p. 137.

† Lee's Theory and Practice of Midwifery.

I believe that Dr. Hamilton was not the only obstetrician who had spoken of and described in very flattering language *these* kind of long forceps operations. Before you venture to undertake such an operation, the utmost care should be taken, in making a vaginal examination, lest you mistake the kind of deformity that prevents the head descending.

I cannot give you a stronger illustration of this, than by quoting the first case of instrumental delivery reported by Dr. Lee, in his Clinical Midwifery:—"On the 28th June, 1823, I (Dr. R. Lee) was present at the delivery of a woman aged thirty, who had been in labour nearly three days and nights, under the care of a midwife. It was the first child. The orifice of the uterus was not fully dilated, and it was very rigid; the vagina swollen and tender, the abdomen tense, and painful on pressure. Tongue loaded, urgent thirst, countenance flushed, pulse rapid and feeble. The labour pains for ten or twelve hours had been gradually becoming more feeble and irregular. The head of the child was strongly compressed and much swollen, and the greater part was above the brim of the pelvis. *An ear could not be felt*, and the hollow of the sacrum was empty. It was determined, by the practitioner who had charge of the case, to attempt to deliver with the long forceps, and he observed, before proceeding to introduce the blades, that it was a case in which the superiority of the long over the short forceps would be observed in a striking manner, and that in less than a quarter of an hour the delivery would be safely and easily completed, and the life of the child preserved. The blades of the forceps were, however, introduced with great difficulty, and still greater was experienced in getting them to lock. Strong traction was then made for several minutes, and the blades slipped off the head. *This happened several times;* but the attempt to deliver was not abandoned till the operator was exhausted with fatigue. The head was then perforated and extracted with the crotchet. Violent inflammation and sloughing of the vagina followed, and about three weeks after delivery, it was ascertained that a large vesico-vaginal fistula existed."*

Dr. Lee, on this case, observes, "This was the first time I ever saw the forceps applied in actual practice; and I was struck with the vast difference which exists between the application of the

* Lee's Clinical Midwifery, p. 6, 7.

forceps to the head of an artificial fœtus put into a phantom, and the head of a living child. I was led to suspect what I now witnessed—that a dangerous degree of boldness and hardihood might readily be acquired by long practice upon a phantom, where this was not combined with attendance on cases of difficult labour."*

I feel the strongest conviction of the truth of these sentiments; and for this reason would urge upon you the importance of closely observing those every-day cases which present to you no difficulties. It is only by educating your sense of touch so as to perceive the relations between the head and the pelvis, that you will detect any deviation from their ordinary proportions, or can estimate accurately the amount of disproportion that exists. It is by the same tact that you know with certainty the manner in which the forceps is applied, or can judge of the propriety of its application. It is only by such previous education you can hope to perform any instrumental delivery with success, and, therefore, the study of the presentations in these ordinary, but too often neglected, cases of natural labour, is a far safer mode of acquiring skill in the application of the forceps, than practising on those clumsy imitations of Nature that are commonly employed, under the fanciful names of "phantom," "mannikin," "dolly," etc. etc.

A very few observations only are required on those cases where the position of the head in the pelvic cavity is altered. *When the face is towards the pubis*, the ear can still be felt, and therefore the forceps may be applied in the manner already described. In this case, it is still more necessary to dislodge the head, and to endeavour to rotate it into the correct position. If this cannot be done, the perinæum must be very carefully guarded from injury as the head is descending, because the pressure upon it is so great. When the face presents, the forceps may also be applied over the ears, and when traction is made with the instrument, the handles should be directed downwards and backwards towards the perinæum, in order that the chin may the more readily be brought under the arch of the pubis. As soon as this is accomplished, they should be held in the axis of the vagina while the head is passing over the perinæum. In both these varieties, there is great danger of laceration of the perinæum.

* Op. cit. p. 7.

In our description of these different operations, no allusion has been made to the os uteri—we have assumed that it is fully dilated. This is admitted by all practical writers to be essential to any such operation. It is unnecessary, therefore, to dwell upon such a point. We may conclude this subject in the words of Denman:—"Before the completion of the first stage of labour —that is, before the os uteri be completely dilated, and the membranes broken—the use of the forceps can never come into contemplation, because the difficulties before occurring may depend upon causes which do not require their use, or, if required, they could not be applied with safety or propriety before those changes were made."

LECTURE XII.

OBSTETRIC OPERATIONS.

Operations to save the Mother only—Perforation—Importance of Ausculation—Conditions that authorize Perforation where the Child is alive—Mode of operating when the Head is fixed in the Brim or impacted in the Cavity—Comparative Merits of the Crotchet, and the Craniotomy Forceps—Operation when the Head is above the Brim, or can with difficulty be forced into it—Elizabeth Sherwood's case—Dr. Davis's Osteotomist—Baudeloque's Cephalo-tribe—Sigaultian Operation—Cæsarian Section—Induction of Premature Labour.

Having described those operations which are calculated to preserve the lives of the mother and the child, we must now turn our attention to those which are intended to save the mother only. When the head is so impacted in the pelvic cavity that it would be too hazardous to her safety to attempt delivery by the forceps, the alternative that remains is to perforate the head, to remove as much of the brain as possible, and to extract the child by means of the crotchet or craniotomy-forceps. So serious an operation requires the most mature consideration, especially if the child be alive; but should the death of the child take place before symptoms of danger to your patient present themselves, the operation may be undertaken without hesitation, because it is one much less calculated to injure the soft parts of the mother than that with the forceps, and it is more easily performed.

If, then, there be the least suspicion that the case may terminate in perforation, you cannot be too watchful in observing the symptoms. Your attention should be directed to two objects; first, to control, as far as possible, the inflammation which may arise; and, secondly, to observe carefully the pulsations of the fœtal heart. When you have heard them distinctly, observed the variations in their character, and find that they have ceased, the operation may then be performed. But it would be advisable not to perforate immediately on their cessation, lest you might be

deceived. It is preferable to wait for a short time, if the constitutional symptoms admit of it, and to examine again before you proceed to deliver. The greatest difficulty connected with this operation is *the time* when it must be performed. This is especially the case when the child is alive, and symptoms of inflammation are progressively advancing to a dangerous point. Fortunately these cases are rare; but when they do occur, the practitioner is placed in a dilemma—either he destroys the child—an expedient which he must have a natural repugnance to adopt —or if he attempt to deliver by instruments not destructive to it, he runs the risk of exposing the mother to the most serious dangers, without any certainty that he will succeed even in delivering the child, much less in saving its life. It is well, therefore, to consider the progress of such a case.

The head being tightly jammed in the pelvic cavity, a tumour is very rapidly formed on the presenting part. The vagina is hot, swollen, painful, at first dry, but afterwards moistened with an acrid serous discharge. The urethra is compressed, and the urine retained. The uterus is contracted about the child in the interval of the pains. If the fœtal heart should cease, the child may be removed, and these symptoms subdued without injury to the passages; but if the child be alive, there is still a hope, although certainly a distant one, that it may advance when the head is sufficiently compressed by the pelvis, and the swelling of the passages diminished by the antiphlogistic measures adopted. We are not authorised, therefore, to open the head, until there is some evidence of danger to our patient. It is here, then, that your difficulties begin. To pursue these symptoms: the inflammation, which had commenced in the vagina, extends to the uterus, and engages the constitution in an irritative fever. The surface of the uterus felt through the abdomen is not only hard, but very tender; the patient will not bear to have it touched. When the pains return, her agony is extreme, but in the interval she has no respite from suffering; she still complains of pain and soreness; the expression of her voice is altogether altered; the deep groan of the bearing pain is exchanged for a constant whine; a yellow, oily, offensive discharge flows from the vagina. The pulse is febrile; the tongue furred; the countenance pallid and anxious; respiration laboured, and the stomach highly irritable. She constantly seeks for cold drinks, which are rejected as

soon as taken. The symptoms of exhaustion soon follow; the discharges from the stomach are like coffee-grounds. The patient becomes extremely restless, tossing about the bed, and calling for air. Sudden chills on the surface alternate with clammy perspirations; the temperature of the vagina diminishes, and the fæces are discharged involuntarily. Blowing, in the act of respiration; coldness of the vagina and extremities; and the gradual cessation of the pains, immediately precede the death of the patient. In this train of symptoms, one evidence of danger is, that which shows the inflammation to have extended to the uterus. This might lead to softening of its structure, and consequently to its laceration. When you are satisfied that such is the case, you cannot temporize, the child must be removed. Another evidence is inflammation, increasing in the vagina, which may terminate in slough. This is still more important, if the typhoid character of the accompanying fever, with dry, brown tongue, and very rapid pulse, point out its erysipelatous tendency. In such cases, extensive gangrene very rapidly succeeds inflammation, so that sometimes the whole mucous membrane of the vagina has sloughed away.* Large portions, also, of the anterior or posterior walls of the vagina have been completely detached, and frightful openings made between the bladder, vagina, and rectum. To delay or vacillate, with such a risk before you, would be worse than dangerous: it would be criminal. Any such symptoms would fully authorise this operation, although the child be living. The same rule applies to cases of exhaustion.

With these observations, we shall proceed to demonstrate the manner of performing perforation. The position of the patient is the same as in the forceps operation. The preliminary measures to be adopted are similar, but much more attention is required, because it is so necessary to combat inflammation. We must assume, therefore, that the rectum is empty, and that the urine has been previously withdrawn from the bladder. It would be right, however, to examine the bladder carefully above the pubis before operating; sometimes the neck and fundus of the bladder are so compressed between the head and the pubis, that if a short catheter be used, the urine is only removed from the lower segment, while the principal portion remains above. When this is the case, the head should be pressed back as much as possible, and

* Dr. Doherty on Adhesions of the Vagina, Dub. Journ., vol. xxi. p. 66.

a long gum-elastic catheter, of the size that will pass the urethra introduced; great care should be taken not to use force in its passage, lest the instrument perforate the canal.

Having secured these essential points, two fingers of the right hand should be passed to the most depending part of the tumour that presents. The whole surface of the presentation should be carefully examined, in order to determine the degree of dilatation in the os uteri. If not fully dilated, you should observe its exact relation to the tumour,* and the distance of the edge of the os uteri from its centre; and if the os uteri be very thin and closely embraces the tumour, you should accurately define its margin, lest the degree of dilatation should escape your notice. Having thus made a very cautious examination, let the forefinger of the right hand remain applied to the centre of the presenting part, but rather to the pubic side, and with the left hand introduce the perforator, having the point (which is slightly curved) resting upon, and guarded by, the forefinger. When both fingers meet, the right hand may be withdrawn from the vagina, and the perforator forced through the tumour and bone, at the part where the forefinger had been applied. The stops arrest its further progress. The handles should then be separated, in order to break open the cranium; but care is required in doing so. The first two fingers of the left hand should rest on the stops of the instrument, to prevent the perforator slipping from the opening when the handles are raised, and to save the vagina from injury. With the common perforator, one handle is generally held by the operator, while the opposite is raised by an assistant; but if Naegele's perforator be used, an assistant is not required for this purpose. When the bone is sufficiently broken in one direction, the handles may be changed to the opposite, and a crucial opening made. The perforator should be passed into the cranium, and the brain completely broken up. It may then be removed, but it would be advisable to have the forefinger of the right hand still within the opening, because it frequently happens, when the pressure of the head is very great, the bones so overlap each other, that the opening is again closed, which makes it difficult to introduce the crotchet. This latter step of the

* This tumour, formed on the head by the pressure of the cervix of the uterus, is different from that which afterwards takes place when the head is in the cavity of the pelvis.

operation is often very troublesome, especially if the crotchet be properly curved, because the point of the instrument is so directed that it is difficult to get it introduced. In order to do so, the handle should be directed backwards towards the coccyx, when, with a little careful management, it may be passed through, and the remainder of the brain removed. As soon as this is accomplished, the handle of the crotchet should be held firmly in the right hand, while two or three fingers of the left are applied to the bone externally, partly for the purpose of protecting the vagina, if the crotchet should perforate, but chiefly to prevent it breaking through the bone. Some caution also is required in extraction. The force should be so applied that the bone may be held tightly between the flat part of the point and the fingers, without directing it much on the point itself. In this manner you may proceed, never using more force in extracting than is actually required. As the point of the crotchet frequently slips from its place, it is an advantage to have as much of the bone below it as possible, in order that it may not escape from the opening into the vagina; hence the advantage of perforating rather on the pubic side of the head than the lowest part of the presentation.

We have thought it necessary to detail to you the steps of this operation more particularly, because so much of your success depends upon the manner in which it is performed, and especially as respecting it there seems to be much misconception. This is evident in the construction of these instruments. You will find some crotchets having the shaft as straight as the handle, with the point sharp and spear-shaped. No doubt a crotchet of this kind could be fixed within the cranium without any difficulty, neither would there be the least danger that it would slip from its position; but as soon as the extracting force is applied, being directed completely on the point, there is great risk that it would break through the bone. When the crotchet is properly curved, this is altogether avoided, because, while the point is sufficiently fixed in the cranium to retain its hold, the principal force is employed in compressing the bone against the fingers. These disadvantages induced the late Mr. Holmes and Dr. D. Davis to propose the craniotomy-forceps as a substitute—the revival of an instrument described in the early history of midwifery as the forceps. The craniotomy-forceps is formed of two blades or shafts, one of which has at the extremity a number of teeth,

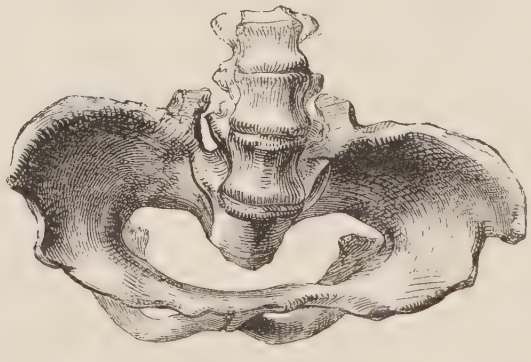
the other, a corresponding number of openings, so that when the blades are applied together, the teeth rest in these openings like sockets. Sometimes the shafts are separate, and may be united like the forceps, by a lock; others are joined together by a hinge-joint. The handles are strong, and the extremity of the blade is smooth and rounded. When the craniotomy-forceps is used, the blade, which is dentated, is introduced within the cranium, while the opposite blade is passed outside; when they are closed, the teeth perforate the bone, and are received by the openings mentioned, and thus the cranium is grasped firmly by the instrument. Extraction may then be made without difficulty, provided the bone does not give way. The craniotomy-forceps may be very easily introduced and applied to the head of the child; the teeth are guarded by the construction of the instrument; and there are no other sharp points to tear the vagina when applied, neither is there the same management required in extracting as there is with the crotchet. Its advantages, therefore, seem to be such as to make it supersede the use of the crotchet. Nevertheless, some of the most experienced practitioners dislike the instrument, because it is liable to one great objection from which the crotchet is free. The bone is so crushed by the craniotomy-forceps, that when extraction is made, it tears away just so much of the bone as was broken, and leaves the head behind. This is especially the case when the child has been dead for some time, and putrescency has commenced. Thus the presenting part of the head may be torn up into fragments without being disturbed from its position. If the instrument fail in its purpose, there is great difficulty in applying the crotchet afterwards, and there is some danger lest the spiculæ of bone broken by the forceps should tear the passages: a lacerated wound of this kind may give rise to very serious inflammation, and therefore increase the hazard of the operation. To obviate this objection, some forceps are made without teeth, having only a strongly serrated edge in the blades, by which the bone is grasped, and prevented from slipping. There is less risk of breaking through the bone with an instrument of this kind, and it is, therefore, less objectionable; but still there is more danger of separating the parietal bone at the sutures than with the crotchet, if the resistance be great. These observations on the comparative merits of the crotchet and craniotomy forceps give you the result of my

own experience in the use of these instruments. The objections stated have also occurred to other practitioners, in whose judgment I have the highest confidence, and therefore I feel the more certainty in their truth. Nevertheless, I should not wish you to infer that the craniotomy-forceps is either a useless instrument or one that should be altogether discarded from practice. On the contrary, in many cases, and especially in those where the head is much ossified, it may be employed with great advantage, if caution be used, and the instrument be properly selected. You should only conclude, from what has been said, that either instrument may be employed usefully in cases especially fitted for their application, but that in the majority of instances in which these kind of difficulties require the aid of instrumental assistance, it is safer to employ the crotchet.

In the description we have given of perforation, your attention has been directed to the operation *when the head of the child has either entered or passed through the brim of the pelvis*, and has there become impacted; but cases occasionally arise that present much greater difficulties even than these. There are instances *where the head cannot enter the brim of the pelvis*, in consequence of its extreme deformity; and in determining the mode of delivery, we are again involved in a cloud of controversial opinions, through which it is difficult to find out the true course to pursue. The object of one of these questions is to determine the limit of perforation, or, in other words, to decide what is the least possible space in the pelvis through which a child may be extracted by the crotchet. Secondly, when, in cases of extreme disproportion, this seems hardly to be accomplished, and, at the same time, the attempt is extremely hazardous to the mother, the question arises, whether it should be at all attempted? When the result is so doubtful, so far as the safety of your patient is concerned, and the destruction of the child is certain, the advocates of the Cæsarian section claim for it the advantage that there is at least a chance of preserving the child, while the risk to the parent can hardly be greater, and therefore they condemn any attempt to perforate under such circumstances.

Time would not permit us to enter into the discussion of these questions. It will be sufficient to point out to you the nature of them, and the different operations which have been suggested to meet the difficulty. The first question sprung up in the discus-

sion of a very remarkable case that occurred in the practice of Dr. Osborne—the case of Elizabeth Sherwood, a cast of whose pelvis is before you. Dr. Osborne states, that "she was so deformed both in her spine and lower extremities, as never to be able to stand erect for one minute without the assistance of a crutch under each arm." At the age of twenty-seven years, however, she became with child, and was admitted a patient into Store-street Hospital. A vaginal examination was made, and "immediately upon the introduction of the finger, I [Dr. Osborne] perceived a tumour, equal in size, and not very unlike in feel, to a child's head. However, it was instantly discovered that this tumour was formed by the basis of the os sacrum, and last lumbar vertebræ, which, projecting into the cavity at the brim, barely left room for one finger to pass between it and the symphysis pubis, so that the space from bone to bone at that part *could not exceed three quarters of an inch.* On the left side of the projection, quite to the ilium, which was about two inches and a half in length, the space was certainly not wider, and, indeed, by some of the gentlemen who examined her afterwards, it was thought to be rather narrower. On the right side, the aperture was somewhat more than two inches in length from the protuberance to the ilium, and, as it admitted the points of three fingers (lying over each other) in the widest part, it might, at the utmost, be about an inch and three quarters from the hind to the fore part, but it became gradually narrower, both towards the ilium and towards the projection."* Such was the pelvis through which



Ovate Pelvis of Elizabeth Sherwood.

Dr. Osborne determined, after consultation with Drs. W. Hunter, Denman, Bromfield, Walker, and Watson, to extract the child with the crotchet. "It was my duty (he proceeds) to perform the operation, which I began about eleven o'clock that night:

* Osborne's Essays, p. 242.

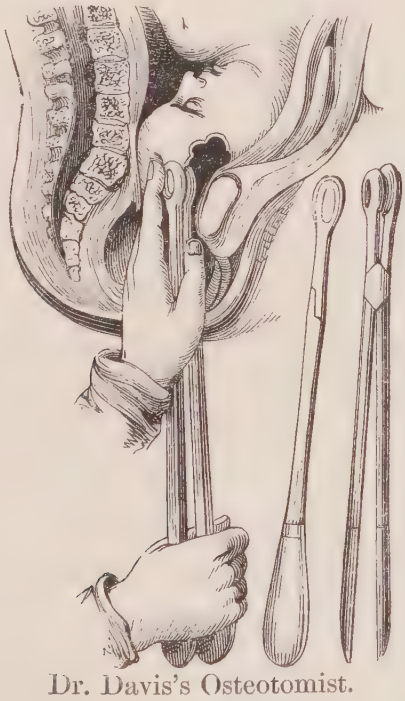
after placing her, in the usual manner, close to the edge of the bed, on her left side, as the situation most commodious both for the patient and myself. Even the first part of the operation, which in general is sufficiently easy, was attended with considerable difficulty and some danger. The os uteri was but little dilated, and was awkwardly situated in the centre and most contracted part of the brim of the pelvis. The child's head lay loose above the brim, and scarce within reach of the finger, nor was there any suture directly opposite to the os uteri. Having desired an assistant to compress the abdomen with sufficient force . . . . I introduced them (the perforating scissors) with the utmost caution through the os uteri, and, after repeated trials, at length succeeded in fixing the point into the sagittal suture near the posterior fontanelle. I very soon, and with great facility, penetrated into the cavity of the head, destroyed the texture of the cerebrum, with a common spoon extracted a considerable quantity, and breaking down the parietal bones, made an opening sufficient for the free discharge of what remained. In this state we left her"* for thirty-six hours, when, "upon examination, a small portion of the head was found squeezed into the pelvis; indeed, there were some little detached bits of the parietal bones lying loose in the vagina. . . . Our intention, by delaying the extraction of the child six-and-thirty hours after opening the head, was, in the first instance, to allow the uterus opportunity, by its continued contractions, to force the head as low and as much within reach of the crotchet as the nature of the case admitted, and afterwards, to induce as great a degree of putrefaction as possible in the child's body, by which means it would become soft and compressible, and afford the least possible resistance in its extraction. . . . I immediately determined to begin to make an attempt to extract the child. *I call it an attempt, for I was far from being satisfied in my own mind of the practicability.* . . . The os uteri being situated as before described, in the most contracted part of the brim of the pelvis, where the space was incapable of permitting the introduction of the curved point of the crotchet, without great difficulty and danger, my first endeavours were bent to draw the os uteri with my finger into the widest part of the brim of the pelvis, and to dilate it as much as possible. Both the removal of the os uteri, and such dilatation of it as the bones admitted, were

* Op. cit. p 247.

effected without much trouble. I then introduced the crotchet, through the perforation, into the head, and by repeated efforts, made in the slowest and most cautious manner, destroyed almost the whole of the parietal and frontal bones, or the whole upper or presenting part of the head: and as the bones became loose and detached, they were extracted with a pair of small forceps, to prevent, as much as possible, laceration of the vagina in their passage through it. The great bulk of the head formed by the base of the skull, still, however, remained above the brim of the pelvis, and from the manner in which it lay, it was impossible to enter without either diminishing the volume, or changing the position: the former was the most obvious method, for it was a continuation of the same process, and, I trusted, would be equally easy in execution. I was, however, most egregiously mistaken and disappointed, being repeatedly foiled in every endeavour to break the solid bones which form the basis of the cranium, the instrument at first invariably slipping as often and as soon as it was fixed, or at least before I could exert sufficient force to break the bone. At last, however, by changing the position of the instrument, and applying the convex side to the pubis, I fixed the point, I believe, into the great foramen, and by that means became master of the most powerful purchase that the nature of the case admitted. Of this I availed myself to the utmost extent, slowly, gradually, but steadily, increasing my force till it arrived to that degree of violence which nothing could justify but the extreme necessity of the case, and the absolute inability, in repeated trials, of succeeding by gentler means. But even this force was to no purpose, for I could not perceive that I had made any impression on that solid bone, or that it had been the least advanced by all my exertions. I became fearful of renewing the same force in the same way, and therefore abandoned altogether the first idea of breaking the basis of the cranium, and determined to try the second by endeavouring to change the position. . . . . I therefore again introduced the crotchet in the same manner, and fixing it in the great foramen, got possession of my former purchase; then, introducing two fingers of the left hand, I endeavoured with them to raise one side of the fore part of the head, and turn it a little edgeways. Immediately and easily succeeding in this attempt, the two great objects were at once accomplished, for the position was changed, and the volume diminished. Continuing my exertions with the crotchet, I soon perceived the

head advance, and, examining again, found a considerable portion of it had been brought into the pelvis. Every difficulty was now removed, and by a perseverance in the same means for a short time, the remaining part of the head was brought down, and out of the os externum."*

We have detailed this case to you more at length, because it accurately describes an operation with the crotchet, different from what we have described—one by which the vault of the cranium is quite broken up and removed, and the base of the skull is drawn obliquely through the contracted brim of the pelvis, the crotchet being fixed in the foramen magnum. It is also remarkable—we might say singular—in the fact, that a child could by any means be drawn through a pelvis so extremely distorted as to have the antero-posterior measurement reduced to three-quarters of an inch; and perhaps the most astonishing fact connected with the case was, that the woman recovered without a bad symptom, and sat up in seven days after such an operation. It is not surprising, therefore, that a warm controversy should have arisen; the advocates of the Cæsarian section condemning the attempt, and protesting against such a case being made a precedent for future crotchet operations; while the supporters of craniotomy claimed the case as a valuable proof of the superiority of perforation to hysterotomy, which latter was generally fatal to the parturient woman.



Dr. Davis's Osteotomist.

Dr. D. Davis contrived several instruments to meet the difficulty of these cases—one was the *osteotomist*, a strong bone

* Op. cit. p. 255.

forceps, intended to cut completely away the bones which form the vault, so as to leave the base of the cranium. Dr. Davis stated that this also may be broken and removed by the instrument, so as to prevent the necessity for that violent exertion which Dr. Osborne was obliged to have recourse to in drawing the cranium through the brim of the pelvis.*

Dr. Davis also contrived a double crotchet, for the purpose of extracting the body of the child, after the head, in this mutilated state, has been brought through the pelvis, and thus he anticipated that the osteotomist would "enable skilful operators to effect deliveries in cases of moderate distortions with much more facility to themselves, and proportionally less danger to their patients, than heretofore, but it will also have the effect of reducing almost to zero, the necessity of having recourse to that last extremity of our art, and the forlorn hope of the unhappy patient —the Cæsarian operation."†

M. Baudeloque, jun., also, has invented an instrument for a similar purpose to the osteotomist, to break up the head, not by cutting it away, but by crushing it together. *The cephalo-tribe* consists of two very strong blades, rough on the inside, and having handles, through which a screw passes. The handles are brought forcibly together by turning the screw, and the blades, by the same power, crush the bones that lie between them (vide fig. 22, p. 233).

Both these operations are intended to supersede the Cæsarian section, and both are liable to the same objection—viz., the extreme difficulty of using them in those cases where they are chiefly required, as well as the danger to which the passages would be exposed in such an operation, especially with the cephalo-tribe. In moderate distortions, where the crotchet or craniotomy-forceps may be used, the *osteotomist* and *cephalo-tribe* are unnecessary, because they possess no advantages which would lead us to employ them in preference to the former instruments. But when the distortion is extreme, and the alternative is the Cæsarian section, from the impossibility of delivery by the crotchet, they would be invaluable, if, as Dr. Davis expected, they could reduce hysterotomy to zero. Both instruments are new, and future

* Dr. Campbell has invented an instrument—the *kephalepsalis*—for a similar purpose as Dr. Davis's *osteotomist*.

† Dr. Davis's Obstetric Medicine, p. 857.

experience must decide the question, but *primâ facie* evidence seems against them. Look at the cephalo-tribe, and ask yourselves, How could that instrument be used in Elizabeth Sherwood's case? To me it seems impossible. Again, with regard to the osteotomist, it must be passed into the uterus, above the brim of the pelvis, and that part of the head within reach of the instrument cut away by it, until the bones are all removed. We question very much whether this could be done under the circumstances supposed; but admitting it to be possible, the difficulty of applying the crotchet to the broken cranium, lying loosely above the brim, must be very great. And if we fail, how are we to act? Are we, then, to have recourse to the Cæsarian section, for the purpose of delivering a mutilated child from the uterus? It is true, we are assuming a mal-adroit performance of the operation, which might arise from want of skill. It is right, however, to do so, and to consider the alternative in cases of failure, if we would properly appreciate the value of the improvement. This objection will, perhaps, appear with more force, from the caution used by Dr. Osborne to avoid such a difficulty in his operation. He first perforated the head, and then allowed his patient to remain thirty-six hours in strong labour, in order that some part of the head (then a putrid mass) might be driven into the brim of the pelvis. He preferred leaving the patient so long in labour, under such unfavourable circumstances, rather than operate, while the head was yet above the brim of the pelvis. For these reasons we very much doubt whether the sanguine expectations of Dr. Davis will ever be realized.

Long before these instruments were invented, another operation was proposed, to supersede the Cæsarian section, which at first was attended with some success, received the approval and honours of the Academy of Medicine, Paris, excited the warmest enthusiasm in its favour, and has now become only a part of obstetric history. Sigault and Le Roy proposed *to divide the symphysis pubis*, and thus to force open the contracted brim. It is sufficient to say that this operation failed in its object, and proved to be so dangerous to the patient, that it has been discarded from practice; we shall not, therefore, dwell upon it, but proceed to the Cæsarian section itself.

This operation is based upon the third principle we have stated to you—viz., when, from the circumstances of the case, the

safety of the mother seems to be more than doubtful, if not hopeless, the child must, if possible, be saved. *The Cæsarian section* is therefore indicated in those extreme cases. In the case of Elizabeth Sherwood, although the crotchet succeeded, its success was the wonder of the professional world, and of none more than Dr. Osborne himself. It cannot, therefore, be taken as a rule to guide your practice. In order to decide upon the Cæsarian section, you should weigh carefully the probable result to the mother if the operation be not performed; and if it appear to you that perforation is impracticable, or so difficult to perform that the danger seems to be nearly as great to the patient as opening the uterus, you are then authorized to undertake the operation, because, if there be a probability that perforation will not ensure safety to the mother, you are certainly bound to consider the child, and to give it a reasonable chance for its life. If, for instance, the ratio of mortality from hysterotomy as compared with craniotomy, in these extreme cases, were equal, or as four to three, this slight difference would not, it appears to me, be sufficient to justify you in destroying the child. Taking this view of the operation, it would be desirable to ascertain by statistical results its precise value, because no estimate of the operation can be formed from individual cases. It is difficult, however, to do so from reports, unless a careful attention is given to the circumstances under which the operation was performed. For instance, the results of the operation in Great Britain and on the Continent differ exceedingly. In the former, more than three-fourths of the patients died, and more than one-half the children were lost. In the latter, the mortality of the mother was much less, and more children were saved. But in Great Britain the operation was performed, as a *dernier ressort*, after the patient had been several days in labour, and under the most unfavourable circumstances, while on the Continent, it was generally undertaken in the first instance. The errors on the one side arose from unnecessary hesitation and delay, and I fear we must add that, on the other, there have been also some mistakes from precipitancy, and some needless operations performed.

Dr. Churchill has given the results of 409 cases of Cæsarian section :—

1st. Among British practitioners, in 40 cases, 11 mothers recovered, and 29 died, or nearly 3-4ths.

2nd. Out of 37 cases where the result to the child is mentioned, 22 were saved, and 15 were lost, or 1 in $2\frac{1}{2}$.*

3rd. Among Continental practitioners, out of 369 cases, 217 mothers recovered, and 152 died, or about 1 in $2\frac{1}{2}$.

4th. Out of 187 cases where the result to the child is given, 138 were saved, and 49 were lost, or nearly 1 in 4.

5th. Taking the entire number, which amounts to 409, we find that 228 mothers were saved, and 181 were lost, or about 1 in $2\frac{1}{2}$; and that out of 224 children, 160 were saved, and 64 lost, or 1 in $3\frac{1}{2}$.

More lately, Keyser, of Copenhagen, has applied himself to the same question; he has carefully examined and checked the accuracy of previous statistical researches on the Continent, and has arrived at a result differing slightly from that of Dr. Churchill. 338 cases are collected, of which 128 proved successful, and 210 unsuccessful. The mortality of the mother is, therefore, 0·62. The same data give 0·31 as the mortality of the children. Keyser has taken great pains to classify the cases according to the different circumstances under which the operations were performed, and has thus ascertained a remarkable fact respecting the degree of contraction in the pelvis:—"*The mortality was less in those cases in which it was extreme than in those in which it was more limited.* It was 0·47 in cases which were $1\frac{1}{2}$ (French) inches and less than this, and 0·66 in cases which were $1\frac{3}{4}$ and more than that measurement."† These latter cases are those in which we have stated that the operation is called for, and therefore, in the Continental practice, where it is performed under the most favourable circumstances, we may assume the mortality to the mother to be about 1 in 2, to the child 1 in 3. I do not think any fair conclusion can be drawn from British practice, because there were so many causes in operation against its success; neither can we ascertain the proportionate mortality where perforation is performed in these extreme distortions. We cannot, therefore, derive any rigid conclusion from a comparison of the results of both operations. But if the circumstances of the case be such that the risk to the patient is increased much beyond ordinary perforation, I do not think we should venture upon that operation in preference to the Cæsarian section. In the former

* Churchill's Operative Midwifery, p. 221.

† London and Edinburgh Monthly Journal, No. LV., p. 542.

case, the child must be sacrificed for a very doubtful advantage. In the latter, there is every reasonable chance of preserving the child, while the mother has at least an equal chance that she will recover. For these reasons we are not disposed to look upon the Cæsarian section with that horror with which some practitioners view it; nevertheless, the serious nature of the operation should be strongly impressed upon your minds, and every caution made use of that is required in capital operations. The strictest antiphlogistic measures should be previously used, to prevent inflammation, and the same means as to temperature, etc., adopted, that have been found so useful in those ovarian operations which have lately occupied public attention. The most essential point, perhaps, to attend to is, *the time* at which the operation is undertaken. It would be advisable to allow some time to elapse after labour commences, to satisfy yourself that the head cannot enter the brim of the pelvis, and thus to confirm your previous diagnosis. At the same time, it would be highly improper to allow labour to proceed to such a length as to hazard either inflammation, exhaustion, or the death of the child. It is for this reason that the operation has so often failed in British practice. In this respect, each case must be considered separately; but you may take it as a rule, admitting of many exceptions, that having previously ascertained, by examination *per vaginam*, the extreme distortion of the pelvis, if after the first twenty-four hours the head does not enter the brim, the operation may be performed. We have Keyser's evidence on this point, also, to prove that such delay would not be injurious to the patient:—"Regarding the time which intervened from the commencement of labour, M. Keyser divides his tables into three categories. In the first, the operation had been performed within the first twenty-four hours; in the second, in the interval between the twenty-fifth and seventy-second hour; in the third, more than seventy-two hours after the commencement of labour. In the first category, the mortality of the mothers was 0·67, that of the infant, 0·28. In the second, the result was respectively 0·55 and 0·33, and in the third, the mortality amounted to 0·72 and 0·60."* From these tables it appears that the middle period, between twenty-four and seventy-two hours, was less fatal to the mother. An operation of so grave a nature should never be undertaken without the aid and assist-

* London and Edinburgh Monthly Journal, p. 542.

ance of at least two professional men of reputation, if it be at all practicable to have their support.

The mode of operating we shall briefly explain. The rectum and bladder must be carefully emptied; the position of the placenta ascertained with the stethoscope, and the exact direction of the uterus observed. If it project forwards nearly in the middle line of the body, and the placenta be in its usual position at the back of the uterus, an incision may be made through the linea alba for about seven inches, commencing above the umbilicus and terminating about two inches above the pubis; the uterus is thus exposed, and the peritoneum along with it. An assistant should press with both hands firmly on the uterus, at either side of the wound, while the uterus is being divided. This must be done by cautious incisions, in the direction of the external wound, until the membranes are seen. These should be raised, and a small opening made in them to allow the liquor amnii to escape externally; the whole fluid may be removed by successive applications of sponges to the opening. The membranes should then be divided on a director the whole length of the wound, and while this is being done, a second assistant should be prepared to grasp and remove the child, while the first maintains pressure on the contracting uterus, to prevent as much as possible protrusion of the intestines or exposure of the peritoneum. The placenta then may be easily removed, the intestines replaced (they always protrude), and the wound united by several sutures; water-dressing and a broad bandage may be applied over the whole.

Lauvergat advised us to puncture the membranes previous to the operation, and this plan has certainly many advantages. The placenta can be heard much more distinctly; the size of the uterus is reduced, and the calibre of its vessels diminished; the amount of hæmorrhage may thus be lessened, and the external wound need not be so large. The peritoneum, also, is less likely to be exposed when the uterus contracts after the child is removed.

The dangers you have to apprehend from this operation are:—

1st. The shock to the constitution, under which the patient may sink;

2nd. The hæmorrhage which may result from the operation; and

3rd. The inflammation of the peritoneum, in consequence of the sac being opened.

The subsequent treatment we shall consider, under these different heads, in another part of the course.

If we have pointed out to you with sufficient clearness the different obstetric operations, the degrees of disproportion to which they are applicable, from the slightest to the most extreme, —from simple delivery by the vectis to the Cæsarian section,—if we have succeeded in defining the limits of each operation, we would now direct your attention to a means of obviating the necessity for those operations that involve the sacrifice of the child.

In cases of contracted pelvis, which prevent the passage of the full-grown child, if labour should take place at the seventh in place of the ninth month, you can readily perceive the possibility of the child (then much smaller) being safely delivered. The child is quite capable of supporting respiration at that period; therefore it has been proposed—and the practice is now very generally adopted—*to induce labour to take place* at the seventh month, when we are satisfied that a living child cannot be born at the ninth month.

The induction of premature labour is one of the greatest improvements in modern practice, because by its means the leading principle of obstetric operations may be carried out, and both mother and child preserved, in cases in which otherwise we could hardly hope for such a result. We shall not occupy your time with by-gone discussions on the propriety of prematurely forcing labour; it is sufficient to say, that its propriety—nay, its necessity —is admitted in the cases which we have described to you, and the only point to be determined, is the case in which the operation is required. We must recollect that, independently of other objections, we have a strong reason for not inducing premature action of the uterus if it can be avoided. The uterus is not prepared for such a change: the cervix is still unfolded, the connexion between the uterus and the placenta is more intimate, the circulation in the uterus less easily diverted into other channels; consequently, you expose your patient to greater risk than at the conclusion of pregnancy, and this you would not be justified in doing without a sufficiently powerful motive. The safety of the child is your justification; but you must have clear proof that it is in danger. You cannot trust to an examination of the pelvis only, because, unless distortion is great, it would be premature to say that the

child cannot be delivered. The most certain evidence is the result of previous labours, and in the diseased pelvis you have generally sufficient proof of its necessity. Perforation may have been performed in the previous labour; or with every successive labour the contraction of the pelvis may have increased, so as to render the last more difficult than that which preceded it. If, in such a case, the previous delivery were completed with much difficulty by the forceps, you may fairly assume that the next will require perforation. Thus, you will generally have sufficient evidence to guide you in these cases; but remember the induction of labour is not suitable in first pregnancies.

Different modes of exciting the action of the uterus have been proposed:—1st. *By direct irritation*, as frictions over this organ, artificial dilatation of the os uteri with the fingers, or by the introduction of a sponge tent; 2nd. *By the specific action of ergot of rye;* 3rd, and lastly, *By deranging the connexion between the uterus and the ovum*, either by detaching the membranes from the sides of the uterus, or puncturing the membranes and allowing the liquor amnii to escape. Of these means the last is the most certain, but, at the same time, one which it would be preferable to avoid if other means were efficient for the purpose, because the liquor amnii would ensure a more favourable dilatation of the uterus, and the child be more secure. Ergot of rye is unsafe, because of the child, the preservation of which is your only motive for interfering; therefore, artificial dilatation by a sponge tent may be first tried, and if it fail, the membranes may be ruptured with a stilette. The action of the uterus sometimes commences immediately, but it may not begin for twenty-four or forty-eight hours after the operation.

LECTURE XIII.

OBSTETRIC INSTRUMENTS.

THE VECTIS: History of—Invented by Roonhuysen, De Bruyn—Secret purchased by Visscher, and Van de Poll—Denman, Bland, Aitken, Lowder, Gaitskill.—THE FORCEPS: Invented by Dr. Paul Chamberlen, and used extensively by him and his Sons, Hugh and Peter—Forceps contrived by Giffard, Chapman, Gregoire —Smellie's Improved Forceps, the Parent of those at present used—Varieties in the Construction of different Forceps—Objects intended by them—Difference in the Principle adopted—Dr. Davis's Forceps, Dr. Denman's, Dr. Beatty's, Dr. Ziegler's. — THE PERFORATOR: Smellie's Scissors, Denman's, Naegele's — Holmes's Perforators—Crotchet—Craniotomy Forceps—Conclusion.

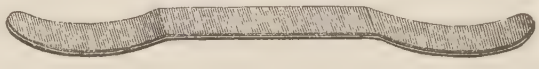
FROM the details of those instrumental deliveries, we wish now to draw your attention to the instruments themselves, and, giving you briefly their history, to point out the alterations and improvements which have been made in them. First, we shall speak of *the vectis* and *the forceps.*

Previously to the introduction of either of these instruments, the state of midwifery was such, that it was sufficient that a labour was difficult, to assume the death of the child. No other operation was known or practised but perforation, and when a midwife (the accoucheur of that day) called for assistance, it was generally because the patient was in danger of her life. The medical man who undertook the operation of delivering the child, did so under the most unfavourable circumstances: the child must be destroyed, and perhaps the parent was not saved by the operation. It is not surprising, therefore, that the obstetrician (or man-midwife, as he was called) should have held a very humble rank amongst his professional brethren—like the plague, destruction seemed to follow in his path—and, consequently, he was an object rather to be shunned than sought after. Operative midwifery was in this condition, when, in the seventeenth century, two practitioners,

one in Holland, the other in this country, contrived instruments by which delivery could be accomplished, and the child's life, at the same time, preserved. One of those inventors was Roonhuysen, a Dutch practitioner, who invented the vectis; the other, Dr. Paul Chamberlen, the inventor of the forceps. The introduction of steam did not produce a greater revolution in the commercial world, than did these instruments in obstetric practice. Deliveries were effected safely that before would have been despaired of, and, not unlike our illustration, with a great economy of time. The reputation of both men soon rose to the highest pitch, but, I regret to add, they did not elevate their profession to the same degree. Governed by mercenary motives, the invention was kept secret by both, and all the aid that mystery could give was employed to magnify its importance. It served the intended purpose: the practice of both increased to the fullest extent, and consequently the number of patients delivered by these instruments was considerable. De Bruyn, one of Roonhuysen's pupils, admits having delivered eight hundred women with the vectis; and from this you may form an estimate of the general number of operations. In fact, the practice of midwifery assumed a new character: formerly, parturition was left to the efforts of nature, and very often far beyond what prudence would dictate. If she failed, and the patient was in danger of sinking under the inefficient efforts of the uterus, the child was dragged away by hooks and crotchets, in whatever way the practitioner could best accomplish it. Now, the principle was changed; art pushed nature aside; delivery became a question of mechanical skill; and, in these times, the principal merit of Roonhuysen and Chamberlen was, that by their invention they could not only deliver a woman where the natural efforts failed to do so, but also they could effect the delivery in a much shorter time than nature could generally accomplish, even where assistance was not so obviously required. Dr. Hugh Chamberlen boasted, that "by this manual operation [the forceps] a labour may be dispatched (in the least difficulty) with fewer pains, and sooner"—than nature could—"to the great advantage, and without danger, both of woman and child."* These secret means of delivering women were sold from one to another, like patent medicines, until at length the secret made its way into the profession.

* Churchill's Operative Midwifery, p. 74.

We have stated that Roonhuysen invented *the vectis*, the use of which he taught to his son Roger, to Ruysch, and to Böckelman. They instructed De Bruyn, and at length, after the secret had passed through three generations, two Dutch practitioners, Jacob de Visscher, and Hugo Van de Poll, influenced by the true spirit of science and philanthropy, purchased the secret from De Bruyn's daughter for 5000 livres, and at once made it known to the world. "Roonhuysen's lever consisted of a flat piece of iron bent into a slight curve at both ends, and he generally employed it covered with soft leather."*



Roonhuysen's Vectis.

This simple contrivance was soon improved upon on the continent by Titsing, Morand, and Herbiniaux. Dr. Denman states, "that when the vectis was first known in this country [England], that described by Heister was preferred to those recommended by the surgeons of Amsterdam. The vectis used by Dr. Cole was like one blade of the forceps, somewhat lengthened and enlarged. That of Dr. Griffith was of the same kind, with a hinge between the handle and the blade; and that of Dr. Wathen was not unlike Palfyn's, but with a flat handle, and a hook at the extremity of the handle, which prevented its slipping through the hand, and might be occasionally used as a crotchet. Many other changes have been made in the construction of the instrument, but the vectis now generally used is of the following dimensions:—The whole length of the instrument before it is curved is $12\frac{1}{2}$ inches; the length of the blade before it is curved, $7\frac{1}{2}$ inches; the length of the blade when curved, $6\frac{1}{2}$ inches; the widest part of the blade is $1\frac{3}{4}$ inches. The weight of the vectis is $6\frac{1}{2}$ ounces. The handle is fixed in wood."† Dr. Bland, who was, equally with Denman, an advocate for the vectis, used an instrument much straighter, and one which could not be employed otherwise than as a lever. Dr. Bland's vectis had the advantage of facility in the introduction; Denman's of security in its purchase on the head. Dr. Aitken, of Edinburgh, wished to combine both advantages, and invented

* Churchill, p. 87.

† Denman's Introduction, p. 286.

what he called the living lever, from its motion resembling that of the finger. A screw was fixed in the handle, by turning which, the blade might be curved to any extent. This instrument soon fell out of use; the mechanism was not sufficiently strong to keep the blade curved when any force was employed in extraction. Lowder's vectis is made with a hinge-joint between the blade and the handle; it can thus be carried very conveniently—unfortunately too conveniently—in the pocket; there is, therefore, a great temptation to misapply the instrument. It had been in very general use when Mr. Gaitskill introduced an improved vectis. He says, "The vectis should be thirteen inches long; one-half to form the handle, the other the curve. The handle should be made of hard wood, rendered rough, for the purpose of obtaining a firmer hold, and made to screw on and off. When the instrument is made with a hinge-handle it is very difficult to introduce, therefore this construction of the instrument should never be adopted."*

Lowder's vectis, with hinge handle.

Gaitskill's vectis (handle screwed on).

In the variety of these instruments you will observe a striking difference in their curvature: some are nearly straight, like Roonhuysen and Bland's; others, like Lowder's, are very much curved. The principle of the former is the lever; of the latter, the tractor. The mode in which Gaitskill applied the vectis has been already explained; and the instrument, in its construction, is adapted to his manner of using it; but it cannot be so conveniently employed in the way we have recommended. The curve of the blade is too abrupt, and the blade itself rather too wide, to introduce conveniently on the pubic side of the pelvis. If the curvature were less and the blade narrower, it would be more suitable for the purpose indicated.

* London Medical Repository, pp. 823, 80, 81.

The forceps was invented by Dr. Paul Chamberlen, somewhere about the year 1650 (the exact date is uncertain); it was kept a secret from all, except his sons Peter and Hugh, for more than sixty years, and at length, in the year 1716, its principle transpired through some channels that have not been correctly ascertained.

We have already stated the boast of Dr. Hugh Chamberlen, that "by God's blessing and their own industry, his father, brother, and himself, had attained to, and long practised, a way to deliver women in this case, without any prejudice to them and their infants." Their success had led Dr. Hugh Chamberlen to calculate rather too confidently on the powers of the instrument; he seemed to think it omnipotent. In the year 1670, he went to Paris for the purpose of selling his secret, and, it is said, had offered it for 10,000 crowns to the first physician of Louis XIV. It was necessary, however, to determine its value; and a case of deformed pelvis soon after presented itself to Mauriceau. The woman had been altogether eight days in labour: on the fifth day the os uteri was fully dilated, but the narrowness of the pelvis was such, that the head could not advance. Mauriceau was again sent for at the end of three days more, and "declared to all the assistants that the delivery could not be effected; of which (says Mauriceau) they being fully persuaded, urged me to draw the child from the belly by the Cæsarian operation, which I would not undertake, knowing well that it is always very certainly mortal to the mother. *But after I had left the woman, without being able to afford her relief*, there arrived, unexpectedly, an English physician, named Chamberlen, who was then in Paris, and who, from father to son, practised midwifery in London, where he has since acquired the highest reputation in this art. This physician, seeing the woman in the condition I have described, expressed his astonishment that I, whom he pronounced and affirmed to be the most dexterous accoucheur in Paris, could not deliver her, and promised that he would do so in less than half a quarter of an hour, *whatever difficulty he might encounter*. He accordingly went to work, and laboured upwards of three hours, without stopping to take breath, and then being thoroughly exhausted, and seeing the poor woman almost dead, he was compelled to abandon the case, and avow the delivery could not be effected, as I had declared. The woman died, undelivered, twenty-four hours after; and I found, on opening the body, which I did

by performing the Cæsarian operation after death, that the whole uterus was torn and pierced in several places by the instruments which this physician had employed blindly without the guidance of his hand, which, being one-half larger than mine, could not be introduced."* Chamberlen left Paris in disgust, or, as Mauriceau says, "he returned to England in a few days, seeing clearly that there were men in Paris more skilful in the art of midwifery than he." The case quoted does not, however, prove any great skill on either side. Chamberlen may have killed the patient by his violence in using the forceps, but Mauriceau left her for eight days in labour, and, for all that we are informed to the contrary, would have allowed her to die without relief. The case, however, proves the indiscriminate use which Chamberlen made of the forceps. His secret was not sold, like Roonhuysen's, so that the instruments invented by him remained unknown for a very long time.

Dr. Churchill states, "About this time [1716], or soon after, the secret appears to have been communicated to one or two, for Dr. R. W. Johnston, when speaking of the forceps, says, 'Besides these, I have a pair of forceps which did belong to the late Mr. Drinkwater (late surgeon and man-midwife at Brentford), who began practice in 1668, and died in 1728. The size and form of this pair agree with those of Chapman and Giffard, save only that the hooks of the handles are turned outwards.' And Mr. Chapman, in 1733, published a description and a plate of the instrument which he had used from the year 1726, stating it to be the instrument used by the Chamberlens, but without stating whence he procured it"† (vide fig. 7, p. 229). We have now sufficient proof that Chapman's forceps was quite different from the Chamberlens', and, consequently, the only way in which the secret was revealed to them was by an explanation of the principle, but not by any exhibition, of the instrument. Chamberlen's forceps was discovered by mere accident many years afterwards. It happened in this manner, as described by Mr. Causardine. The estate of Woodham Mortimer Hall, near Malden, was purchased by Dr. Peter Chamberlen, some time previous to 1683, and continued in his family till about 1715, when it was sold by Hope Chamberlen to William Alexander, wine merchant. In the year 1818 (more

* Mauriceau, vol. ii., pp. 23, 24; Lee's Lectures, p. 291.

† Churchill's Op. Mid. p. 112.

than a century afterwards), in an old chest, found in one of the chambers of this house, certain obstetric instruments were discovered, along with old coins, trinkets, gloves, fans, spectacles, etc. Mr. Causardine's description of these instruments is as follows:— "First we have a simple vectis with an open fenestrum; then we have the idea of uniting two of these instruments by a joint, which makes each blade seem as a fulcrum to the other, instead of making a fulcrum of the soft parts of the mother; and which also unites a power of drawing the head forward. This idea is, at first, by a pivot, which, being riveted, makes the instrument totally incapable of application. Then he goes to work again, and having made a notch in each vectis for a joint, he fixes a pivot in one only, which, projecting, is to be received into a corresponding hole in the other blade, after they have been applied separately. It may be observed, that although there is a worm in the projecting part of the pivot, yet there is no corresponding female screw in the hole to receive it. Every practical accoucheur will know that it is not easy, nor always possible, to lock the joint of the forceps with such accuracy as to bring this pivot and hole into opposite contact. This Chamberlen soon discovered, and next produced a more light and manageable instrument, which, instead of uniting by a pivot, he passes a tape through the two holes, and winds it round the joint, which method combines sufficient accuracy of contact, security, and mobility"* (vide fig. 1. p. 227).

The instruments here described were altogether different from those afterwards brought forward by Chapman and Giffard, about the year 1730. Chapman was the second practitioner who gave lectures on midwifery in London. In them, he explained the new instrument, and the mode of its application. The forceps he employed resembled in the shape of the blades those at present in use; the handles were of steel and hooked at the extremity, the blunt hooks being turned inwards. The blades were united by a kind of mortice-lock, just like the blades of a pair of scissors. Giffard's were similar. Soon after Chapman published his account of the forceps, the inventive genius of the profession was busily employed in making improvements in it. Some of these, as Burton's, did not deserve the name, being rather more clumsy even than the original instrument. Others were only alterations, without the introduction of any new principle. But in 1752,

* Med. Chir. Trans. vol. ix. p. 183.

Smellie's work appeared, and to him we are indebted for the forceps that is the basis of all the modern instruments. The practice before his time is best described in his own words:— "The common way of using them [the forceps] formerly, was by introducing each blade at random, taking hold of the head any how, pulling it straight along, and delivering with downright force and violence, by which means both the *os internum* and the *os externum* were often torn, and the child's head much bruised. On account of these bad consequences, *they had been altogether disused by many practitioners*, some of whom endeavoured, in lieu of them, to introduce *divers kinds of fillets* over the child's head, but none of them can be so easily used or have so many advantages, as the forceps, when rightly applied and conducted according to the directions that shall be laid down in the next section."

"Mr. Chapman, as mentioned in the introduction, was the first author who described the forceps, with the method of using them; and we find in the observations of Giffard, several cases in which he delivered and saved the child by the assistance of this instrument. A forceps was also contrived at Paris, a drawing of which may be seen in the Medical Essays of Edinburgh, in a paper communicated by Mr. Butter, surgeon; but after Mr. Chapman had published a delineation of his instrument, which was that originally used by the Chamberlens, the French adopted the same species, which, among them, went under the denomination of Chapman's forceps. For my own part, finding, in practice, that, by the directions of Chapman, Giffard, and Gregoire, at Paris, I frequently could not move the head along without contusing it, and tearing the parts of the woman (for they direct us to introduce the blades of the forceps where they will easiest pass, and, taking hold of the head in any part of it, to extract, with more or less force, according to the resistance), I began to consider the whole in a mechanical view, and reduce the extraction of the child to the rules of moving bodies in different directions. In consequence of this plan, I more accurately surveyed the dimensions and form of the pelvis, together with the figure of the child's head, and the manner in which it passed along in natural labours; and, from the knowledge of these things, I not only delivered with greater ease and safety than before, but also had the satisfaction to find, in teaching, that I could convey a more distinct idea of the art in this mechanical light than in any other,

and particularly give more sure and solid directions for applying the forceps, even to the conviction of many old practitioners, when they reflected on the uncertainty attending the old method of application. From this knowledge, too, joined with the experience and hints which have occurred and been communicated to me in the course of teaching and practice, I have been led to alter the form and dimensions of the forceps, so as to avoid the inconveniences that attend the use of the former kinds." Smellie introduced two very obvious improvements in the forceps, which have since been retained, and may be considered the essential attributes of the British forceps.* He first proposed the present mode of locking the forceps,† and also had the handles made of wood in place of iron (vide fig. 2, p. 227). These alterations have not been followed in France. The forceps of Gregoire differed from Chapman's only in the iron handles; Gregoire's had their hooked extremities turned outwards; the method of locking was the same: these are still retained in Levret's forceps, which has been for many years in general use in France. So that Gregoire's forceps may be considered the parent of the French—Smellie's, of the British forceps.

From the date of Smellie's forceps to the present day, these leading characters have, with a few exceptions, been continued in the construction of the British instruments, but they are almost the only points in which they agree. The varieties in other respects are almost endless: no two instruments are alike; and the zeal with which new changes are proposed and defended, the superiority which each inventor claims for his favourite instrument, and the constant introduction of some slight alteration, just sufficient to establish the parentage of the new forceps,—this desire for novelty would lead us to suppose that a new forceps was an essential introduction to practice. It would be only a tedious continuation of the history of this instrument to mention in detail all the different forceps proposed, or employed, with the names of the inventors; it is more desirable to point out to you the varieties suggested in the different parts of the instrument, and the objects which they are intended to accomplish.

The length of the forceps is generally about 11 inches, $4\frac{1}{2}$ for the handles, $6\frac{1}{2}$ for the blades. Those intended for the high operation

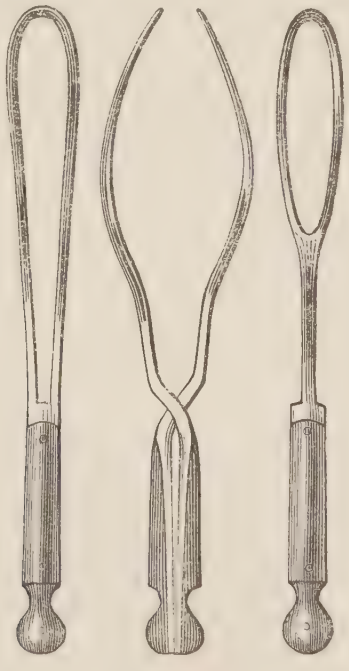
* Smellie's Midwifery, vol. i., p. 250—252.

† Dr. Rigby attributes the introduction of the lock to Chapman.

exceed this. The late Dr. Hamilton's forceps (vide fig. 13, p. 231) was 13½ inches in length; Brüninghausen's, introduced by Dr. Rigby, 13 inches (vide fig. 10, p. 229); Dr. Radford's long forceps, 13¼ inches (vide fig. 12, p. 229). Those which are less than 11 or 12 inches are only intended to be used when the head is resting on the perinæum. This length is generally preferred by those practitioners who object to use this instrument for the purpose of shortening a labour which may be much prolonged. Aitken's short forceps (vide fig. 4, p. 227), Dr. Collins' (vide fig. 6, p. 227), and Denman's (vide fig. 3, p. 227), are about ten inches in length.

The length of the handles is very different, even in forceps which are made for a similar purpose; for instance, the handles of the long forceps used by Dr. Rigby are fully 6 inches; Dr. Radford's, only 3 inches. It is obvious that the greater the length of the lever the greater the power gained; therefore, where much power is sought for, the handles must be long; when too great power is dreaded, the handles are made very short. *The length of the blades* is more uniform, being generally between 6 and 7 inches. The blades of Denman's forceps are about 6½ inches; Haighton's long forceps, 8 inches in length (vide fig. 8, p. 229). Some instruments have a shank between the handle and the blades, so that the lock may be quite external to the vulva, and the soft parts saved from injury in locking the blades. The blades, however, differ extremely in their shape: some are straight, having only a single curve outwards from the lock; others, especially the long forceps, have a second curve backwards, to correspond with the axis of the brim of the pelvis. The latter was first suggested by Smellie and Pugh, and has been adopted by Drs. R. W. Johnston, Osborne, Haighton, Hamilton, Rigby, Ramsbotham, and others. The degree of the lateral curvature is very important. Some are made to embrace the head without compressing it; when such is the intention, the distance between the centre of the blades, where they are most apart, is about three inches, the distance between the extremities of the blades 1½ to 2½ inches, or what is just sufficient to prevent them slipping off the head. When compression is intended, the greatest distance between the blades is about 2½ inches, that between the extremities half an inch, and sometimes even less. *The fenestræ* also vary: some are long, narrow, and pyriform, in order that the blades may be the more easily introduced or withdrawn from the pelvis; other instruments have the fenestræ wide (Dr. Davis's

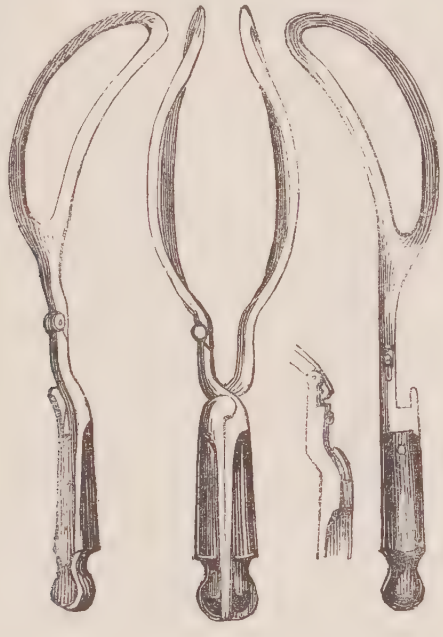
remarkably so) and oval-shaped, so as, by the greater breadth of the blade, to embrace the head more completely, and at the same time to allow its widest part to pass through the blades. A few have no fenestræ. The blades are generally fixed immovably in the handles; but in Dr. Conquest's long forceps, one blade is screwed on, like Gaitskill's vectis. Dr. Hamilton and Dr. Davis made the handle of one part of the forceps moveable, in the same manner as Lowder's vectis. The object of these contrivances is to prevent the length of the handle interfering with the introduction of the instrument, which is sometimes the case with the long forceps, unless the patient is placed very much over the side of the bed. The exceptions to the manner of locking the blades are met with in the forceps recommended by Dr. Rigby; in which one blade has a fixed pivot, the other a notch which fits into it. The late Dr. Beatty contrived a forceps with a transverse opening in the shank of one blade, through which the other passed (vide fig. 16, p. 231). Dr. Ziegler of Edinburgh has proposed another modification of the instrument, which I am informed is much used in Scotland. The fenestra of one blade is carried down to its handle, and in introducing the instrument, this elongated fenestra is slipped over the handle of the other single blade which is first introduced, and thus serves as a guide to the second.



Dr. Ziegler's Forceps.

These are the principal varieties introduced in the construction of the instrument. We have endeavoured to explain the objects

intended by them. Among so many, each differing from the other, and all used by accoucheurs of acknowledged skill, it is no easy matter to determine which forceps is the best. In making a selection, therefore, of any, we must not be understood as wishing to depreciate the value of those we reject. In the construction of these instruments, two different principles seem to have been followed. Some have wished to render the mechanism of the forceps as perfect as possible; others have sought simplicity in its construction. The former have contrived instruments of great power, but which are not very easily applied. The latter have succeeded in the facility with which their forceps may be applied, although with some of them the power is extremely limited. Your late respected professor, Dr. Davis, contrived a



Dr. Davis's Forceps.

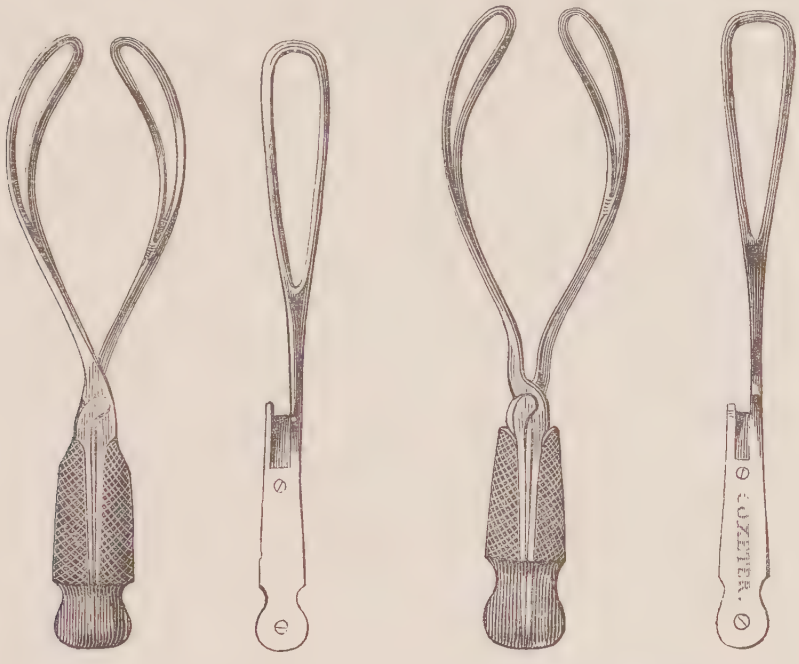
forceps which you may take as an example of the former. In its mechanism it is perfect. It is exactly fitted to the head of the child, so as to lie close without bruising it; the fenestræ are made very wide, in order that the parietal protuberances may pass through them, and the blades are curved very much backwards, in order to correspond with the axis of the brim. If it be applied to the head of the still-born child, the perfect manner in which the head is embraced is quite obvious; therefore, when it is accurately passed over the head of a living infant arrested in the pelvis, there cannot be a greater extracting power; but, in order to accomplish these mechanical advantages, simplicity is

sacrificed, and it is not easy either to introduce or to withdraw the blades. When the ear is near the pubis, and you wish to pass one blade over it, the fenestræ are too wide to allow it to pass behind the pubis; the blade must first be passed along the plane of the ischium, and then brought gradually round to the ear at the pubis; which is certainly inconvenient, and to the young practitioner may be embarrassing. Again, the second curve from before backwards, although receiving the support of many very experienced operators, seems to me to be liable to a similar objection. You may, in your hurry, introduce the wrong blade first; or if you avoid (and of course you will be careful to avoid) this mistake, the curved blade passing in a direction different from the handle, you cannot be so certain that it is correctly applied; on the other hand, the advantage claimed for the curve seems to me one founded much more on theory than practice. These objections only apply to the instrument in the hands of the inexperienced accoucheur; but when, by patient attention, you have acquired that practical tact which is so necessary in this branch of your profession, and which experience will ultimately give you, you will also acquire with it that facility in the application of the forceps, which will render it a matter of indifference which you select, provided the instrument is at all properly constructed.

But, in commencing your career, we must advise you to avoid all complications in instruments—the simpler they are, the safer they will be in your hands. For this reason, we prefer forceps of the latter class, such as have been used by Smellie, Denman, and others, who employ the straight forceps, with the blades narrow, and the fenestræ pyriform. These can always be easily introduced or withdrawn; the handle is a perfect guide to the direction in which the blade is passing, and the only point which it is necessary to secure, is, that the blades do not slip when extraction is made. This cannot take place if the blades be properly curved: their curvature is one of the most essential points in the construction of these forceps. Their extremities should be sufficiently close to retain their position on the head without bruising the face, and, at the same time, the space between the blades should be sufficiently wide to prevent much compression of the cranium.

Experience can alone decide between the merits of similar instruments on a point of this kind; and having used several of these forceps, that which I have found to be the best, and one

which I am disposed to recommend to you, is one used by Dr. Beatty, Professor of midwifery to the College of Surgeons in Ireland, and described by him in the Dublin Journal, vol. xxi. The whole length of the forceps is $12\frac{1}{2}$ inches, the distance between the extreme points of the blades $1\frac{1}{8}$ inch ; the greatest distance between the blades is three inches ; the breadth of the blade $1\frac{3}{8}$ inch.* This instrument is well calculated for that operation which I have described as being intermediate between the operations with the long and short forceps—viz., when the head is in the cavity of the pelvis, without touching the perinæum.



Beatty's Forceps. Beatty's Forceps modified.

When the head is resting on the perinæum, a shorter forceps would be more convenient — for instance, that of Dr. Collins, which is about ten inches in length (vide fig. 6, p. 227). But when the head is fixed in the brim of the pelvis, the forceps of Dr. Radford, having unequal blades, appears to be the most suitable (vide fig. 12, p. 229). In giving you this account of an instrument of so much importance as the forceps, we wish to

* These measurements are those given by Dr. Beatty, in the Dublin Journal, but the instrument which is in my possession, and which I have found so useful, varies a little from this. The entire length is eleven inches and a half; the handle, four inches and a half, blade seven ; greatest breadth between blades, three inches ; between extreme points, one inch and an eighth. To this instrument I have added a shank to the blades about one inch in length, when it is necessary to introduce them high within the pelvic cavity. It is right to state, that the length is taken in a direct line from the extremity of the handle to the extremity of the *curved* blade.

avoid leading you into what seems to us a great error—viz., a belief that by mechanical skill in the construction of the instrument, a great deal more can be accomplished by it than what is really the case. Hence every practitioner has his favourite forceps, and no little boast is sometimes made of the deliveries accomplished by it. But we would beg of you to remember that Smellie and Denman with their simpler forceps, had as much success as Hamilton and Davis with their more ingenious instruments, and *that the success of an operation depends much more on the hands that use the forceps than on the instrument itself.*

It is necessary that the forceps should be sufficiently well formed to embrace the head conveniently, without bruising any part. It should be capable of being easily locked and unlocked, the blades introduced or withdrawn without difficulty, and the handles of sufficient length to hold the forceps firmly, but no more; you should avoid making the length of the handles a means of increasing the power of the instrument. If you secure these points in the forceps you select, you have gained every advantage the instrument can give you; for the rest, your success must depend upon your previous education.

It is unnecessary to dwell at any length upon those instruments which are used for perforation and extraction of the head. This operation was the only one known before the forceps was invented, and at first was never attempted until the child was dead; it was then drawn away by "hooks and crotchets." If the head were too large it was opened by some pointed instrument (Raynald used a penknife), and the hook placed inside. In course of time these instruments were brought to a more definite form, and reduced to the present instruments employed.

The first attempt at *a perforator* was made by Sir Fielding Ould, who invented an instrument which he called "*terebra occulta.*" The point was rounded, had a cutting edge, and was concealed within a sheath, to prevent it injuring the passages. In 1752, Smellie proposed a scissors with a short cutting edge on the outside, terminating in a blunt stop (vide fig. 19, p. 233). By this means, he intended, not only to perforate the bone, but also to cut away the broken fragments. Denman modified this instrument to its present shape. He retained the external cutting edge, widened the stops, to prevent them passing within the opening, and made the

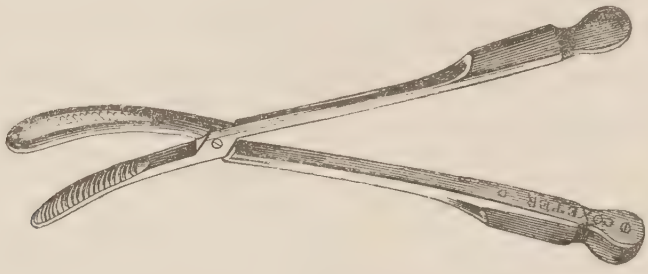
internal cutting edge a flat surface. Thus Smellie's *scissors* became Denman's *perforator* (vide fig. 21, p. 233).

The perforator remained unaltered from Denman's time until the present day, when Naegele suggested an improvement in the hinge-joint. In Denman's perforator it is necessary to open the handles, for the purpose of opening the blades, so as to break the bone. This is often very inconvenient, and an assistant is generally required for the purpose. Naegele, however, altered the hinge-joint in such a manner, that by pressing the handles together the blades were opened; thus, with Naegele's perforator, one hand can accomplish what requires two with Denman's. In order to prevent the handles of Naegele's perforator closing too soon, while being introduced, a straight steel rod passes from one to the other, which can be very easily removed; but, if the catch between the rod and handle be not nicely fitted, if it be too tight or too loose, this object may be defeated; and if the handles are not kept quite apart while the perforator is being introduced, the points separate from each other too soon (vide fig. 20, p. 233). The late Mr. Holmes endeavoured to obviate these accidents—first, by altering the handles, removing the steel-rod, and changing their direction, so that, by pressing fully against them, the blades were kept closed; but lest they might open, the point of the perforator is attached only to one blade (vide fig. 23, p. 233).

Crotchet, having the correct curve.

The crotchet has undergone but little alteration. That invented by Mesnard, and adopted by Smellie, is still very generally used. We have already stated to you the importance of having the shaft of the instrument properly curved, and not, as is often the case, made quite straight, which is only suitable for that extreme operation which we have described in Elizabeth Sherwood's case, and which you should not attempt. Very lately, Dr. Churchill has introduced some improvements in this instrument (vide fig. 25, p. 233). The handle is placed at right angles with the shaft of the instrument, something like the handle of a boot-hook, and the point of the

perforator is notched, so as to have two short points to hold the bone, in place of one long one, which might pass through it.



Craniotomy Forceps.

The craniotomy forceps is sometimes employed in preference to the crotchet: we have already stated the objection to that instrument when made as originally designed by Dr. Davis. The strong points of blade, in forcing through the bone, too often break it up into fragments, without moving the head. To avoid this, Mr. Coxeter, of Grafton-street, has, at my suggestion, made one, by which the bone can be very firmly held without being broken. The surface of the internal blade is strongly serrated with rough lines, which correspond with grooves in the opposite blade, and the bone being held between them can hardly slip from their grasp.

I must now bring to a conclusion this very difficult subject—the management of difficult labours; one which I always feel a reluctance to enter upon, because I cannot go through it without coming into collision with some opposing opinions. In the principles I have laid down I have wished to avoid dogmatism, and have endeavoured to place before you, as impartially as was in my power, the facts upon which the reasoning that led me to them is founded. I think you will find them to be correct, and the safest for you to adopt, when you enter upon practice; but if hereafter, when your experience and manual skill are improved, you find that you can venture on a bolder course than what I have advised, I shall only be too happy to receive the benefit of that experience, and, in return, to be taught by you.

"——— Si quid novisti rectius istis
Candidus imperti; si non, his utere mecum."

Recollect, however, that you must be cautious how you venture upon "a meddlesome midwifery," and *that there are no circumstances to justify violence in performing an operation.*

MEASUREMENTS OF FORCEPS[a]

WHICH HAVE BEEN CHIEFLY USED IN BRITISH PRACTICE.

NAME.	LENGTH				BREADTH.					AUTHORITY.
		BLADE.								
	Whole.	Along curve.	Direct.	Of handle.	Greatest between blades.	Between points.	Of blade.	Length of shank.	Second curve.	
Chamberlen's forceps	11	$7\frac{1}{2}$	$6\frac{3}{4}$	$4\frac{1}{2}$	$2\frac{11}{12}$	1	$1\frac{1}{2}$	0	0	Measured from the original[b] vide fig. 1.
Giffard's do.	$12\frac{1}{2}$	$7\frac{1}{4}$	$6\frac{2}{3}$	$5\frac{1}{4}$	$2\frac{1}{3}$	2	$1\frac{3}{4}$	—	—	Mulder
Chapman's do.	15	$9\frac{3}{4}$	9	$5\frac{1}{4}$	$2\frac{1}{3}$	0	$1\frac{2}{3}$	—	—	Do. vide fig. 7.
Smellie's short do.	$11\frac{1}{2}$	$6\frac{1}{2}$	6	$5\frac{1}{2}$	2	0	$1\frac{1}{6}$	—	—	Do. vide fig. 2.
Do. long do.	$12\frac{1}{2}$	$7\frac{1}{4}$	7	$4\frac{3}{4}$	2	0	$1\frac{1}{3}$	—	2[d] c.	Do.
Pugh's short do.	11	$7\frac{1}{4}$	7	$3\frac{3}{4}$	$2\frac{1}{2}$	$\frac{1}{6}$	1	—	2[d] c.	Do.
Do. long do.	14	$8\frac{3}{4}$	$7\frac{1}{4}$	$5\frac{1}{4}$	$2\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{3}$	—	2[d] c.	Do.
Johnston's do.	11	$6\frac{2}{3}$	6	$4\frac{1}{3}$	$2\frac{1}{2}$	0	$1\frac{1}{6}$	—	2[d] c.	Do.
Lowder's do.	$11\frac{1}{3}$	$6\frac{1}{2}$	6	$4\frac{5}{6}$	$2\frac{2}{3}$	$\frac{2}{3}$	$1\frac{1}{2}$[c]	—	0	Do.
Osborne's do.	$11\frac{1}{4}$	$6\frac{3}{4}$	6	$4\frac{1}{2}$	$2\frac{3}{4}$	$\frac{1}{12}$	$1\frac{1}{3}$	—	—	Do.
Denman's do.	$10\frac{3}{4}$	$6\frac{7}{12}$	$6\frac{1}{4}$	$4\frac{1}{6}$	$2\frac{5}{12}$	$\frac{1}{6}$	$1\frac{5}{12}$	—	—	Do.
Do. do.	10	7	$6\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{5}{12}$	$\frac{1}{8}$	$1\frac{5}{12}$	—	—	Measured,[d] vide fig. 3.
Do. do.	$11\frac{3}{8}$	0	7	$4\frac{3}{8}$	$2\frac{7}{8}$	1	$1\frac{3}{4}$	—	—	Ramsbotham[e]
Haighton's do.	$13\frac{1}{2}$	0	8[f]	$5\frac{1}{2}$	$2\frac{7}{8}$	$\frac{7}{8}$	$2\frac{1}{4}$	$3\frac{3}{8}$	2[d] c.	Radford,[g] vide fig. 8.
Hopkins' do.	12	8	$5\frac{1}{2}$	5	$2\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{4}$	$1\frac{1}{2}$[h]	2[d] c.	Measured, vide fig. 18.
Hamilton's do.	$13\frac{1}{8}$	0	$7\frac{5}{8}$	$5\frac{1}{2}$[i]	$2\frac{5}{12}$	—	—	—	2[d] c.	Radford, vide fig. 13.
Aitken's do.	$10\frac{1}{2}$	0	$6\frac{1}{2}$	4[k]	3	$1\frac{11}{12}$	$1\frac{5}{12}$	—	0	Measured, vide fig. 4.
Davis's do.	$11\frac{1}{2}$	0	$6\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{5}{8}$	0	$2\frac{1}{4}$[l]	$1\frac{3}{8}$	2[d] c.	Davis, vide page 219.
Conquest's short do.	11	$7\frac{1}{2}$	6	4[m]	$2\frac{8}{12}$	$\frac{10}{12}$	$1\frac{10}{12}$	1[m]	0	Measured, vide fig. 5.
Do. long do.	$14\frac{1}{2}$	0	$6\frac{1}{2}$	6[n]	$2\frac{1}{2}$	1	2	2	—	Radford
Ramsbotham's long do.	$12\frac{3}{4}$	0	$8\frac{1}{2}$	$4\frac{1}{4}$	$2\frac{7}{8}$	1	0	$1\frac{1}{2}$	2[d] c.	Ramsbotham, vide fig 9.
Brüninghausen's do.[o]	13	8	7	6	$2\frac{10}{12}$	$\frac{7}{12}$	$1\frac{3}{4}$	—	2[d] c.	Measured, vide fig. 10.
Beatty's, W. (late) do.	11	$7\frac{1}{6}$	$6\frac{1}{2}$	4	$2\frac{10}{12}$	$\frac{10}{12}$	$1\frac{5}{12}$	$\frac{1}{12}$[p]	0	Do. vide fig. 16.
Beatty's, T. do.	$12\frac{1}{2}$	0	8	$4\frac{1}{2}$	3	$1\frac{1}{8}$	$1\frac{3}{8}$	—	0	Beatty } vide p. 221.
Do. with shank do.	$12\frac{1}{2}$	0	$6\frac{1}{2}$	$4\frac{1}{2}$	3	$1\frac{1}{8}$[q]	$1\frac{3}{8}$	$1\frac{1}{2}$	—	Measured }
Churchill's do.	12	8	$7\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{7}{8}$	1	$1\frac{5}{12}$	—	—	Do.
Collins' do.	10	0	$5\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{5}{8}$	—	—	Collins, vide fig. 6.
Ziegler's do.	$12\frac{1}{2}$	0	5	$4\frac{1}{2}$	$2\frac{6}{8}$	1	$1\frac{6}{8}$	3	—	Ziegler, vide p. 218.
Radford's long do.[r]	$13\frac{3}{4}$	0	$10\frac{3}{4}$[s]	3	$2\frac{6}{8}$	0	$2\frac{3}{8}$	$3\frac{1}{2}$	0	Radford, vide fig. 12.
Do. the short blade	13	0	10	3	$2\frac{6}{8}$	0	$2\frac{3}{8}$	$3\frac{1}{2}$	0	Do.
J. Y. Simpson's forceps[t]	13	$6\frac{3}{12}$	6	5	$2\frac{10}{12}$	$1\frac{2}{12}$	$1\frac{10}{12}$	2	2[d] c.	Measured, vide fig. 14.

[a] The measurements of these forceps have been taken either from the authorities stated, or from actual measurement, viz., 1. The whole length of the instrument, taken in a direct line from the extremity of the handle to the end of the blade. 2. The length of blade along the curve 3. The length of the blade in a direct line, from lock to point. 4. Length of handle. 5. The greatest space between the blades. 6. The same between the points. 7. The breadth of the single blade. 8. The length of the shank.

[b] This forceps seems to have been the last and the most improved of four made by Chamberlen.

[c] Greatest breadth of blade near the lock.

[d] From one in my possession.

[e] Ramsbotham, Principles, etc., p. 288.

[f] Length of blade includes the shank.

[g] Radford's Essays "On the Long Forceps," p. 3.

[h] Shank forms a ring.

[i] The handle attached to one blade by a hinge-joint.

[k] A moveable roller is placed between the handles.

[l] Fenestræ very wide.

[m] The shank twisted.

[n] One handle screwed on to the blade.

[o] Introduced and used by Dr. Rigby. A pivot lock.

[p] There is a transverse opening in the shank, through which the opposite blade passes.

[q] The measurement is here given in one-eighth fractions, to correspond with Dr. Beatty's.

[r] The blades being unequal, the measurement of each is given. The locks are reversed.

[s] The measure of the blade includes the shank, which forms a ring.

[t] Knees above joint to prevent unlocking; joint loose to allow lateral motion.

FIG. 1.

The most improved of five instruments made by Chamberlen, copied from the original.

FIG. 2.

Smellie's forceps covered with leather.

FIG. 3.

Denman's forceps, copied from a fac simile of one in possession of the Dublin Lying-in Hospital.

FIG. 4.

Aitken's forceps. A small roller is fixed in one handle, which is moved by a screw, and is so adapted as to keep the handles separated when the instrument is grasped.

FIG. 5.

Conquest's forceps, with wide fenestræ. The shanks twisted.

FIG. 6.

Collins' forceps, blades straight.

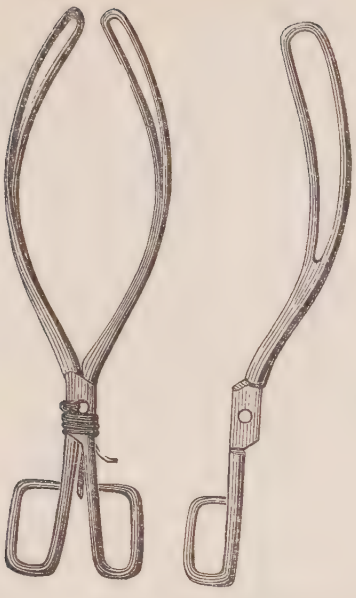


FIG. 1.—Chamberlen's Forceps.

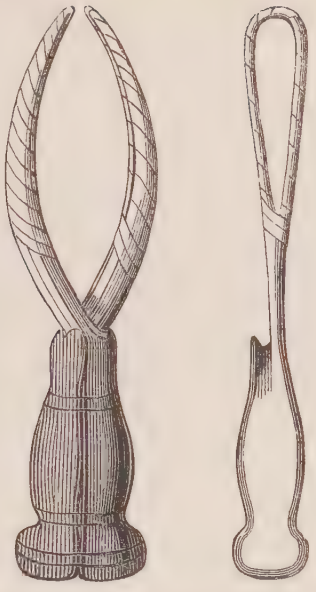


FIG. 2.—Smellie's Forceps.

FIG. 3.—Denman's Forceps.

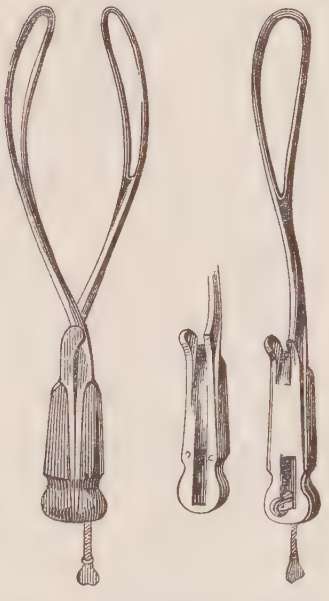


FIG. 4.—Aitken's Forceps.

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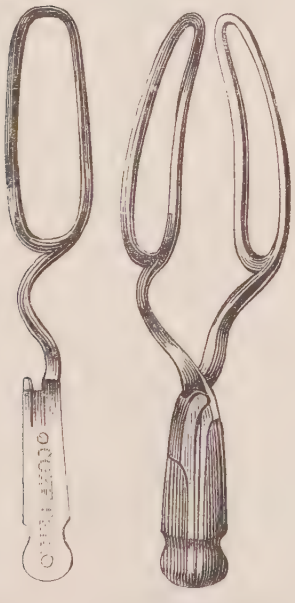

FIG. 5.—Conquest's Forceps.

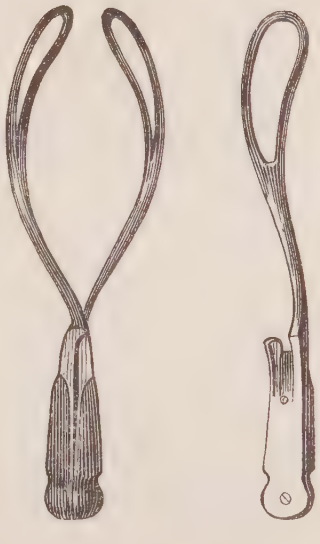

FIG. 6.—Collins' Forceps.

FIG. 7.

Chapman's forceps, from which Gregoire's and the French forceps seem to be derived.

FIG. 8.

Haighton's forceps; blades very light and slightly curved backwards; handles long.

FIG. 9.

Dr. F. Ramsbotham's forceps, with shank and second curve.

FIG. 10.

Brüninghausen's forceps, used by Dr. Rigby.

FIG. 11.

Davis's forceps, with unequal blades.

FIG. 12.

Radford's forceps, with unequal blades; handles short; shank forms a ring.

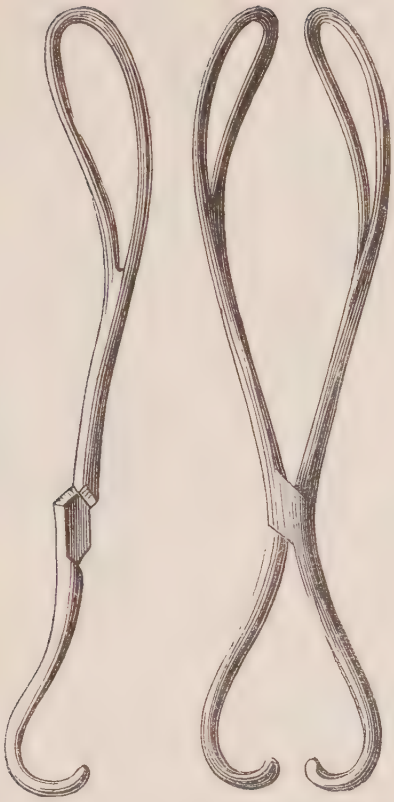

FIG. 7.—Chapman's Forceps.

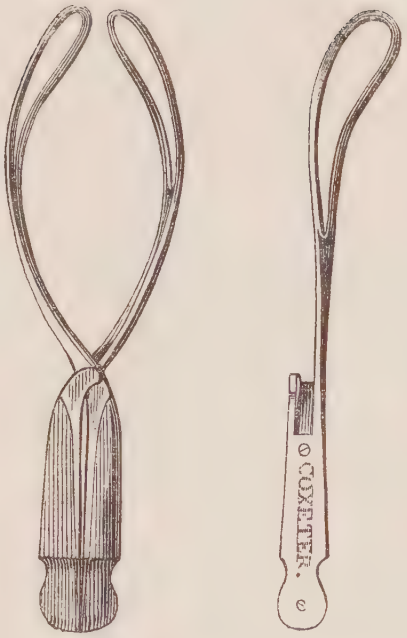

FIG. 8.—Haighton's Forceps.

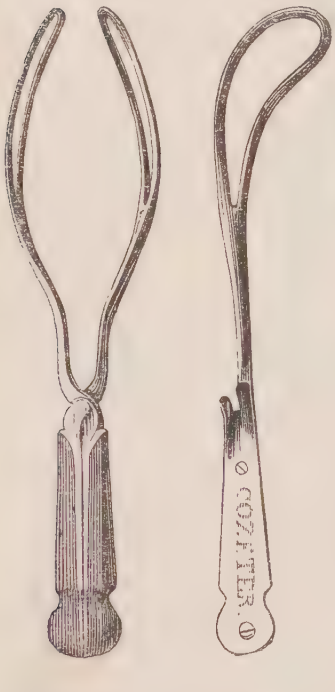

FIG. 9.—Ramsbotham's Forceps.

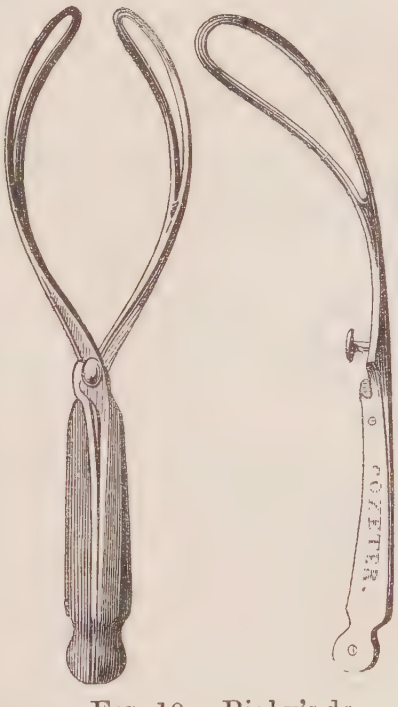

FIG. 10.—Rigby's do.

FIG. 11.—Davis's

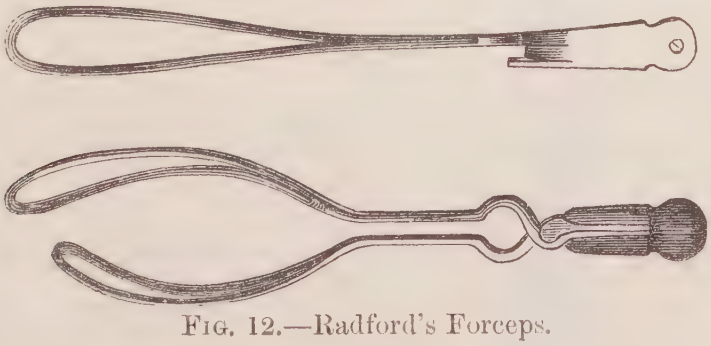

FIG. 12.—Radford's Forceps.

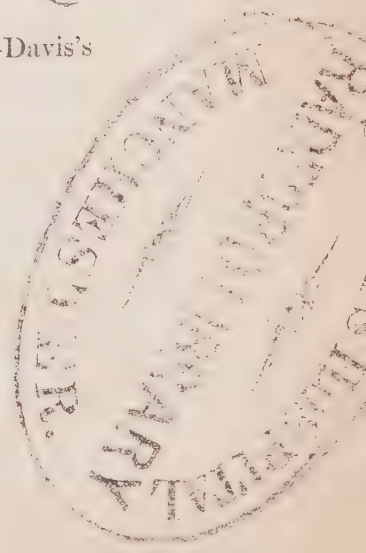

FIG. 13.

Hamilton's forceps; blades strongly curved backwards; one handle moveable on the blade.

FIG. 14.

Dr. J. Y. Simpson's forceps. Knees above the joint to prevent them unlocking. Joint so loose as to allow lateral motion to a considerable degree. Handle so as to use the instrument as a tractor rather than a compressor.

FIG. 15.

A modification of Ziegler's forceps, which had been copied from a pair supposed to be Dr. Z.'s. Inventor unknown.

FIG. 16.

The late Dr. W. Beatty's forceps, having a transverse opening in the shank of one blade sufficiently wide to admit the other.

FIG. 17.

Churchill's forceps. Blades straight and the fenestræ short. The greatest distance between the blades near the extremity.

FIG. 18.

Hopkins' forceps. Blades having wide fenestræ and second curve; shank forms a ring; handles long.

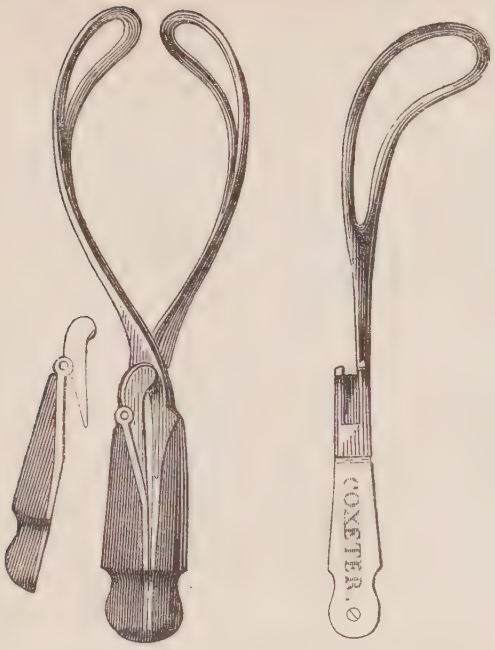

Fig. 13.—Hamilton's Forceps.

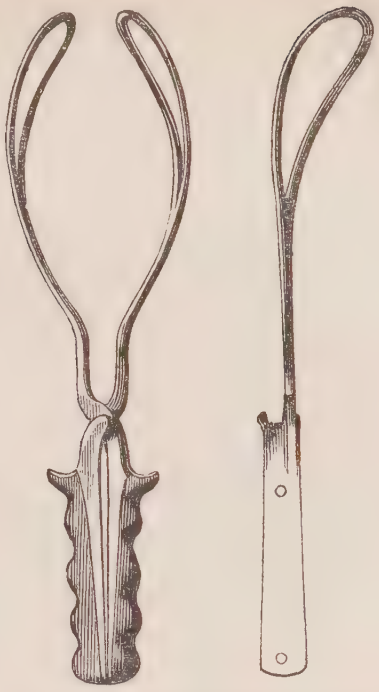

Fig. 14.—Simpson's Forceps.

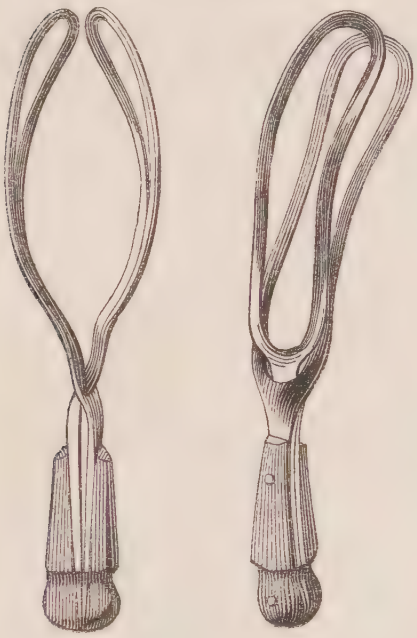

Fig. 15.

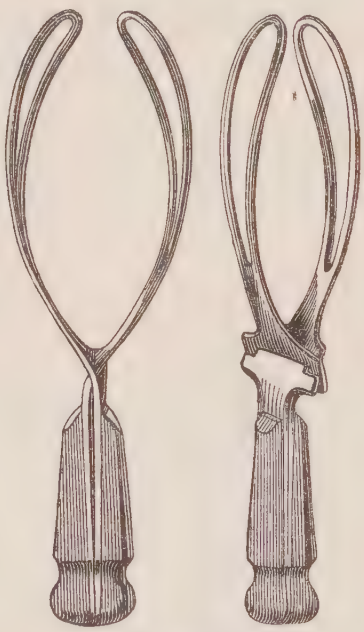

Fig. 16.—W. Beatty's Forceps.

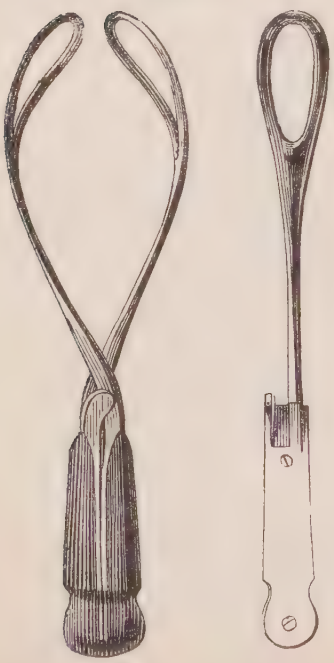

Fig. 17.—Churchill's Forceps.

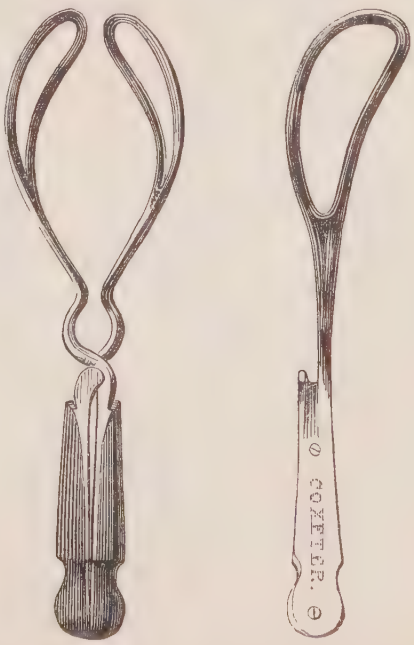

Fig. 18.—Hopkins' Forceps.

FIG. 19.

Smellie's scissors, with rounded stops, and having the outer edge like the inner, sharp.

FIG. 20.

Naegele's perforator modified. The point is formed by one blade, but so as to leave the other of sufficient length to prevent it escaping from the opening made in the cranium.

FIG. 21.

Denman's perforator. The inner cutting edge of Smellie made flat, the stops not rounded.

FIG. 22.

Baudeloque's cephalotribe. The blades forced together by the power of a screw.

FIG. 23.

Holmes' perforator. The blades closed by separating the handles. The point attached to one blade.

FIG. 24.

Craniotomy forceps. One blade having transverse ridges adapted to similar grooves on the opposite blade.

FIG. 25.

Churchill's crotchet. Point, double. Handle, transverse.

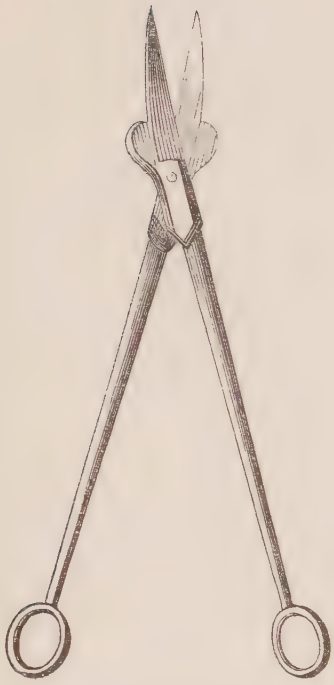

FIG. 19.
Smellie's Scissors.

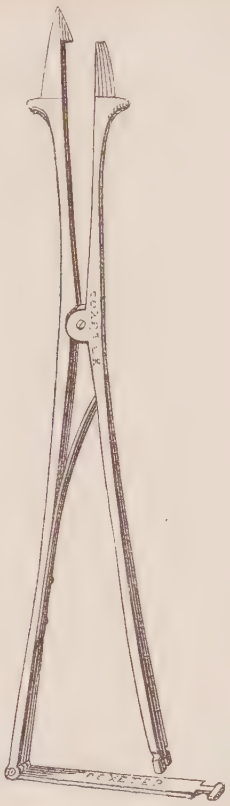

FIG. 20.
Naegele's Perforator.

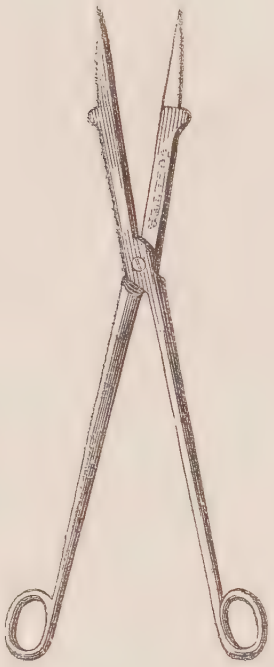

FIG. 21.
Denman's Perforator.

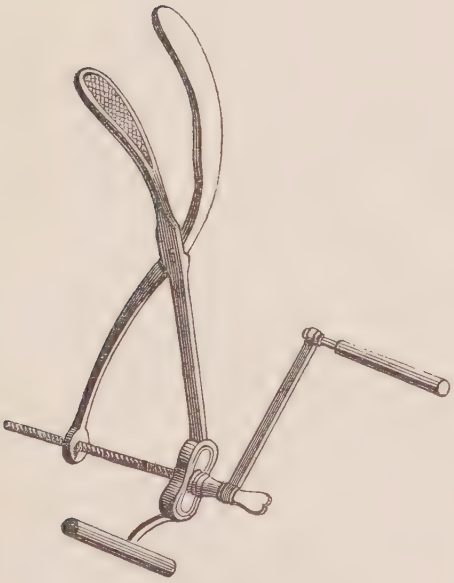

FIG. 22.
Baudeloque's Cephalotribe.

FIG. 23.
Holmes' Perforator.

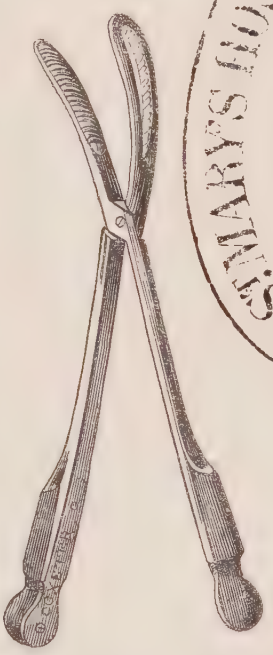

FIG. 24.
Craniotomy Forceps.

FIG. 25.—Churchill's Crotchet.

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SUMMARY

OF THE

PRINCIPLES AND RULES

LAID DOWN IN THE PRECEDING
LECTURES,

ARRANGED AS APHORISMS,

TO WHICH SOME OF DENMAN'S ARE ADDED.

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APHORISMS.

SECTION I.

MECHANISM OF NATURAL LABOUR.

I. Labour is the action of the uterus to expel its contents when the fœtus is sufficiently mature to sustain respiration, p. 42.

II. Labour is called natural "if the head of the child present, if the labour be completed in twenty-four hours, and if artificial assistance be not required" (Denman), p. 43.

III. Labour may be divided into three stages. The first stage is dated from the opening of the os uteri to its complete dilatation. The second stage commences when the os uteri is perfectly dilated and terminates in the expulsion of the child. The third stage is occupied with the expulsion of the placenta, p. 44.

IV. The dilatation of the mouth of the uterus (the first stage) is effected chiefly by the muscular fibres of the fundus acting upon it through the medium of the liquor amnii, which conveys accurately to the os tincæ the whole power of the uterus (p. 48—51), moderates and equalizes the force employed, and dilates the mouth of the uterus without exciting irritation. The pains caused by this action are called *grinding pains*.

V. The order of uterine action is from the fundus to the mouth of the uterus, p. 51.

VI. When the os tincæ offers any unusual resistance to the fundus, the force of the fundus is not increased, the action is frequently renewed, and may be for a time suspended, in order to diminish irritation, so that the object of nature is to accomplish her purpose by time rather than by force, p. 59.

VII. When the dilatation of the uterus is completed, *the second stage of labour* begins. There is then a marked difference in the uterine contraction. Not only is the entire force of the uterus employed, but it is aided by the muscles that bound the abdominal cavity. The pains that accompany this action are called "bearing pains," p. 60.

VIII. The manner in which the head passes through the pelvis in its most usual position, is as follows—

1st. When the head is above the brim of the pelvis, the forehead and the occiput are nearly on the same level, but when the head enters the brim, the occiput descends lower than the sinciput, and glides a certain distance along the plane of the ischium, against which it rests. The forehead then advances more rapidly at the opposite side of the pelvis, until it is arrested by the convergence of the ischium and the shorter sacro-ischiatic ligament. The occiput then again descends obliquely along the ischio-pubic ramus, and emerges with part of the parietal bone beneath the pubic arch.

2nd. Simultaneous with this motion, there is a very slight rotation on the longitudinal axis of the head, by which that side of the head which is next to the pubis descends lower than that near the sacrum, so that the parietal protuberance of the pubic side becomes the presenting part.

3rd. As the head is so advancing through the pubic cavity, the shape of the pelvis obliges it to pass in a spiral direction : hence the head, which may enter the pelvis in the oblique or transverse measurement, is turned as it descends towards the conjugate axis.

4th. When the head escapes from the outlet, the occiput rests against the ramus of the pubis and ischium, and becomes a fixed point, round which the remaining portion of the head successively passes out. In some instances, the occiput rests directly against the arch of the pubis, and the head is expelled in the conjugate axis of the outlet. According to the more usual course, it passes out obliquely, pp. 61, 62, 63.

IX. There are generally *four* positions of the head in which the parietal bone presents. 1st. Left occipito-cotyloid. 2nd. Right occipito-cotyloid. 3rd. Left fronto-cotyloid. 4th. Right fronto-cotyloid. Two in which the face presents. 1st. Right mento-cotyloid. 2nd. Left mento-cotyloid, pp. 64—66.

X. The four positions of the vertex may be known by the anterior and posterior fontanelles, and by the ear.

XI. When the head begins to press on the perinæum, the mucous secretion is increased in the vagina, the head advances and retires with the pains for some time, until the perinæum is sufficiently stretched. The pains then become more powerful, and force the

head through the vulva, there is then the greatest danger lest the perinæum be lacerated, p. 71.

XII. When the head is expelled, the face turns towards the right thigh in the first position, toward the left thigh in the second position. In the latter case the arms frequently lacerate the perinæum, p. 72.

XIII. As soon as the expulsion of the child is accomplished, the uterus ceases to contract for some time, the interval varying from five to fifteen minutes ; then the contractions are renewed for the expulsion of the placenta. This constitutes *the third stage of labour*, p. 73.

XIV. If the abdominal muscles contract sufficiently, or if artificial support be given to the fundus during the contractions of the uterus to expel the child, the placenta is generally separated at the same time, and may be either expelled from the vulva or into the vagina, p. 73.

XV. If the uterus be without support, the placenta may be retained either from deficient irritation or irregular contraction. Hæmorrhage does not usually accompany retention caused in this way, p. 73.

SECTION II.

MANAGEMENT OF NATURAL LABOURS.

XVI. The "show" is a slight sanguineous discharge, arising from the ruptured vessels of the mouth of the uterus, when it first dilates. As soon as this takes place, labour properly begins. The patient has now entered upon the first stage, p. 78.

XVII. When called upon to attend a patient, *the summons should be instantly responded to.* Your introduction should not be abrupt; and if called to a patient for the first time, still greater caution should be exercised, pp. 79, 80.

XVIII. During the early part of the first stage, it is not necessary nor advisable to remain in the room with your patient. It will be sufficient to remain in an adjoining room, until there is occasion to make a vaginal examination, p. 81.

XIX. When the pains have continued for some time regular and frequent, an examination may then be made. The patient, loosely attired in her night-dress, should lie on the bed on her

left side, as near to the edge as possible, having the knees drawn up towards the abdomen. You should then wait until the pain returns, and when it is about to cease, pass the forefinger of the right hand, anointed with cold cream, or any unctuous substance, within the vagina. Examine whether it be rigid or relaxed, dry or moist. Examine the rectum through the posterior wall, and fundus of the bladder through the anterior. Introduce the middle finger, in order to examine the os uteri. Pass both fingers along the sacral side of the vagina, and when you cannot advance them further, direct them forward towards the pubis, you then feel what seems to be the irregular folds of a flaccid bag projecting into the vagina: examining this with caution, the edge of the os uteri may be traced; if the finger be passed within it, you will sometimes feel the head; you may often fail, and yet the head present. The dilatability of the os uteri, its direction, and the degree to which it is opened, should be ascertained, pp. 82, 83.

XX. If the membranes are ruptured early, an examination should always be made, lest the funis or the shoulder present. Before the fingers are withdrawn from the neighbourhood of the os uteri, examine the distance of the sacrum, and as they are being withdrawn, ascertain if possible the space in the pelvic cavity, p. 83.

XXI. In order to make a sufficiently careful examination, a little time may be required, during which the pains may return; you should then cease until they subside, noting only those points which have been mentioned; but make it a rule not to withdraw from your examination, until you have perfectly satisfied yourself as to the character of the labour. Having accomplished this, a second examination during this stage, unless it be prolonged, would be unnecessary, p. 83.

XXII. The first stage of labour is not always completed before the second begins. The grinding pains merge into the bearing pains so gradually as to require some attention to observe the change. When the bearing pain comes on, the patient is obliged to grasp firmly whatever is within her reach, she retains her breath more than before, and sometimes makes an involuntary effort to bear down. Her voice also alters, its tone is more subdued, and she seems more patient of her sufferings than before. Sometimes the complete dilatation of the os uteri is marked by constitutional

symptoms; there may be a slight rigor or vomiting, perhaps a strong inclination to go to stool, p. 87.

XXIII. The patient must now remain in bed, which should be properly prepared for her reception. A skin of Morocco leather, or a broad piece of India-rubber cloth, must be placed next the bed, to protect it from being stained, and a blanket folded very wide, and enclosed in a soiled sheet, placed underneath the hip of the patient as she lies upon her left side. They should be so fastened together, that the whole may be removed at once, p. 87.

XXIV. When the bearing pains become decided, a sheet should be fastened to the bed-post, and so within reach of the patient that she may grasp it firmly. The nurse should support her feet by pressing a pillow against them. Small pillows between the knees are very inconvenient, p. 88.

XXV. During the second stage, the patient often becomes fatigued and thirsty. You must imperatively forbid heating drinks of all kinds to be given to the patient. A free ventilation of the apartment should be secured, and as few persons as possible permitted to remain in the room, p. 89.

XXVI. In the second stage of labour more than one examination is necessary, but if examinations be repeated too often, the passages become dry and irritated. *The first object* of the examination is to determine the proportion between the head and the pelvis; *the second object* is to ascertain the exact position of the head; *the third object* is to note the progress made by the head, pp. 92, 93, 94.

XXVII. In order first *to determine the proportion*, the finger should be passed, in the interval of the pains, between the pubis and the head, and moved round on either side. The ear can be felt if there be sufficient space for the head to pass, but if the head be high up in the pelvis, the finger can only just touch it, p. 92.

If the ear cannot be reached, and there seem to be a disproportion, its degree may be judged by feeling the scalp. When the head is only slightly compressed, the scalp is simply folded or puckered by the closing of the sutures; as the compression increases, these folds merge into one, which ultimately forms a distinct tumour. This continues to enlarge, so that in cases of *impaction* of the head it is sometimes of great magnitude, p. 92.

XXVIII. *To ascertain the exact position of the head*, pass the finger to the sagittal suture. This traverses the presenting part of the head, and looks towards the sacrum. Direct it along this sutu e towards the left obturator space and plane of the ischium, a fontanelle will then be felt: if it be the posterior (a small triangular space or a point where three sutures meet) it is the first position. If it be the anterior fontanelle (a large membranous space bounded by four sides or undefined), it is the third position. When the fontanelle is on the right side of the pelvis, the second position may be distinguished from the fourth in the same manner, pp. 64, 65.

XXIX. If there be a doubt of, or difficulty in, feeling the fontanelle, the ear will determine the side of the pelvis to which the occiput is applied, the lobe of the ear being felt on the corresponding side, p. 67.

XXX. You must be prepared to support the perinæum the moment it suffers any degree of distension. Sit behind the patient as she lies upon her left side, the back of the chair being towards the head of the bed, and while the head of the child is passing through the pelvic cavity press moderately *with the left hand* over the hip of the patient. *With the right hand* support the perinæum. A single fold of a fine napkin should be placed along the edge of the perinæum, and the right hand so applied that the fold of skin between the fore-finger and thumb should correspond to it, the fore-finger and thumb passing on either side of the vulva, and the palm of the hand resting against a thicker fold of the napkin, applied to the posterior part of the perinæum, pp. 94, 95.

XXXI. The perinæum should not *be pressed against too soon;* rather wait until you feel the head protruding with each pain through the vulva. The pains are very unequal, and the object of being prepared to support the perinæum early is to resist too violent distension by them. Support the perinæum against the powerful pains. It is not necessary to press strongly when the pains are weak, pp. 95, 96.

XXXII. When the head is passing the vulva, do not draw the perinæum backwards nor push the head too rapidly forwards. In either case the widest part of the head would be forced too soon over the perinæum. When the head is delivered, examine carefully lest the funis be coiled round the neck. If it be a single coil it is sufficient to draw down more of the funis and loosen it.

If two or more, one must be brought over the head. When this cannot be done the funis must be divided, which should never be done if it be possible to avoid it, p. 96.

XXXIII. When the shoulders are passing the perinæum, caution must be used lest the arms should lacerate it, especially in second positions of the head. Sometimes the shoulders require to be assisted, which may be done by placing the fore-finger of the right hand within the axilla of the child's arm, on the pubic side, and guarding the perinæum carefully with the left hand, p. 97.

XXXIV. As soon as the shoulders and thorax of the child are delivered, it can respire, and is so far beyond danger; no haste should, therefore, be used in extracting the body and lower limbs; it is preferable to allow the uterus gradually to expel them, and while it is doing so, the left hand should be immediately applied over the fundus, in order to maintain a moderate pressure upon the uterus while it is descending towards the pelvis, p. 97.

XXXV. Pressure should then be maintained either by a temporary bandage or by the hand of an assistant, and the funis tied and divided. Apply a strong ligature of housewife thread, bobbin, or narrow tape, about two inches from the umbilicus, and a second about an inch further. You must be careful to see the part of the funis you are dividing, lest the fingers or any part of the child should be in your way, and also to examine the cut surface of the umbilical portion. The blood should be squeezed out of the vessels, and the surface wiped with a napkin, for the purpose of detecting any oozing of hæmorrhage that might take place if the funis were not properly tied, pp. 97, 98.

XXXVI. The hand may be applied to the fundus and a very moderate pressure is often sufficient to expel the placenta completely out of the vagina; but if not, it can be drawn out by the funis quite easily, directing the traction in the axis of the vagina. But if the uterus should not obey the stimulus at first, do not persevere; it is always more advisable to wait for some time than to use too much irritation. Neither should you attempt to remove the placenta by the funis alone, p. 98.

XXXVII. After delivery, a bandage is necessary to support the pelvis by compressing it as much as possible, and to support the uterus by moderate and equable pressure over the whole abdomen. The bandage should be rather more than a yard long

and half a yard wide. It should first be drawn evenly over the pelvis; its lower edge, when so placed, being about an inch below the trochanter. This margin should be drawn as tightly as the patient will bear and pinned securely below the right trochanter. The bandage should be again drawn and pinned in a similar manner across the crista of the ilium, so that the pelvis may be embraced by this portion of the bandage, about three inches in width, as tightly as possible. The remainder of the bandage should be drawn and pinned with moderate tightness, but equally from the pelvis to the diaphragm, so that the whole abdomen be included in it without projecting over the bandage, p. 99.

XXXVIII. When the bandage is applied, the folded sheets that had been placed under your patient during labour should be removed, and replaced by others dry and warm, in order that she may be induced to sleep. She must not be disturbed afterwards, p. 100.

XXXIX. If the placenta be not separated in the first instance, wait for an hour, and again, by pressure, excite the action of the fundus. This should be brought as nearly as possible toward the centre of the pelvis, and grasped firmly by both hands. As soon as the fundus becomes hard, strong pressure upon it is generally sufficient to cause the expulsion of the placenta: if it should not, do not use any violence; rather let the nurse, under your direction, maintain the fundus in the same position, while you pass the fingers, and, if necessary, the hand, into the vagina, in order to stimulate the uterus to contraction, p. 101.

XL. In order to remove the placenta, the funis should be held firmly in the left hand, and the fingers of the right passed along it within the vagina. Sometimes this alone excites contraction; but if not, all the fingers, in a conical form, may be introduced within it as far as the os uteri. You will often find a large portion lying at the upper part of the vagina, you may even feel the insertion of the funis, but do not attempt to withdraw it; pass the hand still toward the os uteri, and, by irritating it, the portion of the placenta that lies within the cervix is often detached. If this be not sufficient, withdrawing the hand along the vagina for a short distance will excite contraction ; but if both means fail, the fingers must be introduced within the os uteri, when the upper part of the placenta may be grasped and the whole removed. The assistant should press on the fundus while the hand is being withdrawn. The placenta should never be drawn away by the lower portion, p. 102.

SECTION III.

DIFFICULT LABOURS.

XLI. Difficult labours are divided into *tedious* and *laborious labours*. When labour is prolonged beyond the average period (twenty-four hours) without being at any time unusually severe, it is called "*tedious*." When, without reference to time, there is a powerful struggle carried on by the uterus to overcome some unusual resistance, it is called "*laborious*," p. 105.

XLII. When labour is tedious from *over-distension* of the uterus, puncture the membranes within the os uteri as high as you can reach, so that the liquor amnii may escape gradually. When the uterus is thus relieved, the pains increase in strength and frequency, and labour proceeds rapidly to its conclusion, p. 106.

XLIII. *When extreme obliquity of the uterus* is the cause of delay, mere change of position is sometimes sufficient to remove this difficulty. If not, or the uterus hang very much over the pubis, a bandage may be applied so as to draw the fundus gradually upwards, pp. 106, 107.

XLIV. When the fundus of the uterus is thrown very much forward, the os uteri is drawn upwards and backwards toward the promontory of the sacrum, and when labour begins, the anterior lip, being the most dependant part, often becomes so thin as to resemble the membranes. It might be mistaken for them; and the cause of delay supposed to be rigidity of the membranes. The supposed membranes—that is, the uterus—might be accordingly punctured. If the presenting surface be carefully examined, the os uteri will be felt toward the promontory of the sacrum, p. 108.

XLV. When a patient is suffering from *hysterical excitement* great caution is necessary. Conversation should not be permitted within hearing of the patient—none but her immediate friend and nurse should be allowed in the room—strict attention should be paid to the evacuations, p. 109.

XLVI. *Mental despondency* is obscurely marked by symptoms of nervous shock—a rapid and feeble pulse—a tendency to chill—coldness of the extremities—constant watchfulness—listless expression—feeble pains;—these are the most dangerous cases. Stimu-

lants are necessary—ergot of rye, to hasten the action of the uterus —and the forceps, if the second stage be at all prolonged, pp. 113, 114.

XLVII. When the os uteri is *rigid*, and the woman of a plethoric habit, a free depletion from the arm, followed by nauseating doses of tartarized antimony, will often relieve it. If she be hysterical, or leuco-phlegmatic, local depletion and cathartic enemata are preferable, p. 115.

XLVIII. When the head is *arrested with the face towards the pubis*, the correction may sometimes be made with the fingers, but it is preferable to introduce the vectis on the pubic side of the pelvis, to press back the head in the intervals of the pains, and to rotate it gradually towards the sacral side. If *the face-presentation* be in a similar manner *arrested*, as few vaginal examinations as possible should be made, merely such as are sufficient to determine the arrest: when this is ascertained recourse must be had to the forceps. When *the longitudinal axis of the head is fixed across the pelvic cavity* the anterior fontanelle is very distinct. In the interval of the pains press up the forehead, and so retain it until the following pain returns, when the occiput will descend, p. 121.

XLIX. *The hydrocephalic head* may be known by the increased size of the fontanelles—the mobility and separation of the sagittal suture—the great overlapping of the parietal bones during a pain, if the head have entered the pelvic cavity, and the general looseness of the bones. If the head be arrested, perforation is required; but the head thus enlarged often passes through the pelvis without assistance, p. 124.

L. *When the head is above the brim* of the contracted pelvis, and it is desirable to determine the degree of disproportion, the simplest and most efficient pelvimeter is the hand of the practitioner. In ordinary vaginal examinations, when one finger only is introduced, the superior part of the sacrum is quite out of reach. When the point of the finger touches the upper part of the sacrum, it is evidence that the sacrum is pressed too much forwards; if it touch the promontory, or just below it, it is very doubtful whether the head can pass. In some cases, when the cavity and outlet are very wide, the whole hand may be introduced within the pelvis; and if the brim be contracted, the degree to which the fingers are compressed will determine the amount of diminution. In the standard pelvis, the fingers, when in the

brim, may be slightly separated from each other. In a slight contraction, through which the head may pass, they are pressed close together. In greater disproportion the fingers overlap each other; and in extreme cases, three, two, and sometimes even one finger only can be introduced: but, excepting in such extreme cases, do not hastily assume, even with every evidence in this way obtained, that the head cannot pass the brim, until time and close observation of the labour removes every doubt, pp. 130, 131.

LI. *When the head is fixed in the brim of the* OVATE *pelvis*, the outlet and cavity being wide, the head may be delivered with the long forceps, p. 132.

LII. The term "*arrest*" is applied to cases where, although the head ceases to advance, the cause either does not depend upon disproportion in the pelvis, or when disproportion exists, it is not so great as to render the delivery of a living child impossible. When the head is pushed back, the finger can pass with facility between the head and the pelvis, the ear may be touched, the parietal bones do not overlap each other strongly, and the scalp is only puckered. If a tumour be formed on the presenting part, it is diffused, increases slowly, and seldom attains any magnitude, p. 133.

LIII. The term "*impaction*" is employed when the head not only ceases to advance, but when there is every evidence that its further progress is beyond the power of the uterus. The head cannot be easily displaced, it is impossible without force to pass the finger between it and the pubis; the ear cannot be felt; the urethra is compressed, the parietal bones are strongly overlapped, and a tumour grows very rapidly to a great size, often completely obscuring the characters of the presentation; the vagina is also swollen and congested, p. 133.

LIV. Difficult labours become dangerous to the patient, when they give rise either to inflammation of the passages or exhaustion of the uterus. Inflammation of the vagina may terminate in slough; inflammation of the uterus, in softening of its proper structure: the former may cause fistula, the latter rupture of the uterus. Exhaustion gives rise to sudden and dangerous hæmorrhage which may be fatal, and sometimes causes fatal syncope without hæmorrhage. In either case—whether inflammation be present, or the premonitory symptoms of exhaustion shew themselves—labour must be brought to a conclusion, p. 136.

LV. In cases of slight deviation from the standard pelvis, where there is every evidence of space sufficient for the head ultimately to pass through the pelvis, if nature be allowed time for the purpose, interference is improper, although the period of twenty-four hours may be exceeded. But if the head be arrested, and so remain for four hours, notwithstanding the pains are regular and strong, the forceps may be used. If the pains be only feeble or absent, the action of the uterus may be suspended; although the head may be arrested for four hours during that suspension, it may advance when the action of the uterus is renewed. Assistance is not therefore required, until it is found that the uterus fails to do so, p. 142.

LVI. When the head is not arrested, but at the same time advances so extremely slowly in consequence of the narrowness of the pelvis that it seems to be arrested, there is no increased danger either to the mother or to the child in leaving the delivery to the natural efforts. The forceps is not therefore called for,* p. 150.

LVII. *When the head is impacted* in the pelvic cavity, it cannot be delivered by the forceps without such injury to the passages as might endanger the mother's life. The probability of preserving the child's life is not sufficiently certain to justify an attempt which might be so hazardous. In the great majority of these cases, the death of the child takes place naturally; and it may be removed before symptoms dangerous to the mother present themselves, p. 162.

LVIII. If the reverse occur, and danger to the mother—whether from exhaustion or extending inflammation—be indicated before the death of the child, then perforation is called for, rather than render the risk to the mother a certainty by the dangers that result from a forcible extraction by the forceps, p. 162.

LIX. When *the head is retarded at the outlet* of the pelvis, it may arise from the perinæum being rigid, or from the arch of the pubis being too narrow, so that the head cannot pass out between the ischio-pubic rami. The strictest attention is necessary to subdue any tendency to inflammation in the perinæum. Fomenta-

* Feeble constitutions are seldom able to endure very protracted suffering; cases, consequently, sometimes occur which are exceptions to the above rule, in which the premonitory symptoms of exhaustion appear before labour is concluded. The slightest indication of exhaustion should be attended to, and, when present, delivery effected.

tions must be sedulously employed, and, if necessary, depletion by leeches. Sometimes the vectis may be passed on the pubic side of the head, to assist its advance; but where the difficulty arises from narrowness of the pubic arch, the forceps is preferable, pp. 162, 163.

SECTION IV.

OBSTETRIC OPERATIONS.

LX. The rules that govern the application of instruments are founded upon three principles—

1st. *To preserve the lives of the mother and child.* If this be doubtful—

2nd. *To preserve the life of the mother without reference to the child.* When this cannot be done—

3rd. *To save the child if possible*, p. 172.

LXI. The instruments used for the *first object* are *the vectis* and *the forceps.* For the *second*, *the perforator*, *the crotchet*, *the craniotomy forceps*, *the osteotomist*, *the cephalotribe.* For the *third*, the Cæsarian section is performed, pp. 171, 172.

LXII. The vectis is intended to act as an extractor, to assist the feeble action of the uterus, to correct mal-positions of the head, or to overcome any usual resistance of the perinæum. It is not, therefore, an instrument of much power, and its use is limited to the removal of slight impediments to the passage of the head, p. 172.

LXIII. The forceps is more generally used in the practice of midwifery, and is an instrument of much more extensive application. It may be employed when the head is at the outlet, in the cavity, or in the brim of the pelvis. The *short forceps* is used in the two former operations. The *long forceps* in the latter, p. 176.

LXIV. The following general rules must be observed before these instruments are applied—

1st. It has long been established as a general rule, that instruments are never to be used in the practice of midwifery; the cases in which they are used, are, therefore, to be considered merely as exceptions to this rule [Denman].*

2nd. But such cases can very seldom occur in the practice of

* Aphorisms.

any one person,* and when they do happen, neither the forceps nor any other instrument is ever to be used *in a clandestine manner* [Denman].

3rd. The first stage of labour must be completed, that is, the os uteri must be dilated and the membranes broken, before we think of applying the forceps or the vectis [Denman].

4th. The difficulties which attend the application and use of the forceps are far less than those of deciding upon the proper time when, and the cases in which, they ought to be applied [Denman].

5th. The lower the head of the child has descended, and the longer the use of the forceps is deferred, the easier in general will their application be, the success of the operation more certain, and the hazard of doing mischief less [Denman].

6th. Care is also to be taken that we do not, through aversion to the use of instruments, too long delay that assistance we have the power of affording with them [Denman].

7th. A rule for the time of applying the forceps has been from the following circumstances: that, after the cessation of the pains, the head of the child should have rested, for *six hours*,† in such a situation as to allow the use of the forceps before they are used [Denman].

8th. But this, and every other rule intended to prevent the rash and unnecessary use of the forceps, must be subject to the judgment of the person who may have the management of any individual case [Denman].

LXV. Before the vectis is applied, you must first observe those preliminary measures necessary in all obstetric operations. The urine should be withdrawn with an elastic gum catheter of rather large size (No. 10), and without the stilette. It is always safer to use a catheter of this kind, because there is less risk of injuring the urethra, if it should be compressed, than if the unyielding silver catheter be employed. An enema should also be administered, and when the bowels are relieved, the patient, lying on her left side, must be drawn as near to the edge of the bedstead as possible. The pelvis must be raised more than usual, and if

* An obstetric physician, who is frequently consulted, will of necessity meet more cases of this kind than another.

† *Four hours* is sufficient for this purpose, and the cessation of the pain is not essential.

the patient has been lying on a bed, and not on a mattress, it would be advisable to place a hair cushion under the hips. The vectis should be placed in warm water, and anointed, p.174.

LXVI. Introduce two fingers of the right hand between the head and the symphysis pubis. Passing them on either side of the symphysis, the tip of the ear will be felt without difficulty. The finger must remain applied to it while the vectis is being introduced. It should be held about the middle, between the two forefingers and thumb of the left hand, and the handle directed downwards and backwards towards the coccyx, in order that the blade may lie flat upon the head, when the instrument is passing between it and the fingers of the right hand. When the blade is so applied, press it gently forwards with a slightly oscillating motion, until the edge reaches the lobe of the ear, which is now placed exactly between the finger and the vectis. The handle must therefore be depressed still more, in order that the edge may pass over the ear. When this is safely accomplished, the finger may be withdrawn, and the vectis passed forward to its proper position, p.174.

LXVII. "Then, grasping the handle of the instrument firmly in the right hand, wait for the accession of a pain" [Denman], (which, although absent before, almost always returns when this new irritation is applied to the uterus), and draw steadily with it. "When the pain ceases let the instrument rest, and on its return repeat the same kind of action, resting and acting in imitation of the manner of the pains" [Denman], p.175.

LXVIII. Carefully avoid using the vectis as a lever; and in order to do so the more certainly, it is better to pass two fingers of the left hand between the head and the perinæum, and to grasp the shank of the instrument with the remaining fingers; counter-pressure is thus made similar to the forceps, and the vectis may be used solely as a tractor, p.175.

LXIX. When the head begins to advance, and to press strongly on the perinæum, the introduced fingers may be withdrawn, and the vectis maintained in its position, rather for the purpose of acting with if the pains should again become feeble, than to extract the head by its means, if the uterus be sufficient to expel it: thus the perinæum will be better secured from injury, pp.175, 176.

LXX. When the vectis is used to correct mal-positions of the

head, it is better to operate with one not too much curved. One blade of the forceps will often answer in these cases, p. 176.

LXXI. *The operation with the forceps, when the head is resting on the perinæum*, may be undertaken, if there be any diminution in the transverse measurement of the outlet of the pelvis. The pubic blade, with the lock looking upwards, must be passed over the ear in a similar manner to the vectis; and when so placed, the handle may be raised towards the pubis, and there maintained by an assistant in its *exact position.* Pass two fingers of the left hand between the head and the perinæum; hold the sacral blade lightly by the handle with the right hand; and, taking the lock of the introduced blade as your guide, endeavour to direct it so along the introduced fingers, that the edge of the sacral may pass along the lock of the pubic blade. As the sacral blade passes forwards, and the locks approach each other, the handle of the pubic blade should be taken in the left hand, and drawn slowly towards the perinæum. In this manner the locks will glide together, and the instrument be applied without much difficulty, p. 178.

LXXII. When the pains return, the handles of the forceps should be held firmly, the perinæum being carefully supported by an assistant, and traction made at first very moderately, carefully observing the action of the uterus; and as you perceive that the pains are inefficient, the force may be increased. With each effort the handles may be drawn, first with a slightly waving motion to either side, and then upwards towards the pubis, in order that the head may pass in the axis of the vagina. When the head advances, and you are satisfied that the difficulty is overcome, it is better to leave the rest to the uterus, because there is less risk of injuring the perinæum. For the same reason, it would be advisable to unlock the forceps, and to withdraw the sacral blade, leaving the pubic to act with as a vectis, pp. 178, 179.

LXXIII. *When the head is arrested in the cavity of the pelvis*, the forceps may be introduced in the same manner as before; but if the ear be out of reach, the presentation must be carefully examined. The lambdoid suture may be traced passing up from the posterior fontanelle towards the ear. The trochanter also will give the direction of the plane of the ischium. Both will assist in guiding the pubic blade. The passage of the sacral blade is rather more difficult; its advance is frequently checked as it

approaches the brim of the pelvis. If such should happen, be very careful not to use force in pressing it forwards. It is better to act with the pubic blade for a short time as a vectis, and if the head advance, even slightly, the opposite blade will frequently glide into its place, p.182.

LXXIV. When the forceps is applied, dislodge the head from its situation in the first instance, because some accidental displacement may be the cause of difficulty which the uterus cannot correct. When the head is relieved, it will glide into the correct position, and may be delivered without difficulty. If, however, the head remain arrested, the forceps must be seized firmly; and in order to secure your hold, a coarse napkin might be placed loosely round the handles. A steady and powerful traction should be maintained so long as the pain continues; and when it ceases, *the grasp of the instrument must be at once released, and remain so until the succeeding pain*, when the same steady traction may be renewed. As the head advances more easily, and approaches the perinæum, leave it as much as possible to the uterus, p.182.

LXXV. When the forceps is in the pelvic cavity, the shank of the instrument lies between the tubers of the ischia. When the head is in the hollow of the sacrum, the handles are directed towards the pubis. It is advisable rather to follow than to guide the direction of the head, because as it descends it will *naturally* change its position, which might be prevented by attempting too hastily to turn it, p.183.

LXXVI. *The operation when the head is fixed in the brim of the pelvis* differs from either of the preceding operations; the blades are applied over the occiput and face of the child, and not over the ears. Two fingers and as much as possible of the right hand should be passed behind the trochanter towards the centre of the ilium on the superior side of the pelvis; and if the anterior fontanelle be felt distinctly, the longer blade of the forceps (if they be unequal) should be passed over the fontanelle to the face of the child: the shorter blade may then be passed in the opposite direction over the occiput, guiding it by the lock of the introduced blade, p.184.

LXXVII. When the forceps is properly applied, the handles look downwards and backwards towards the perinæum and in the axis of the brim; traction must be made in this direction, and, when the pain commences, the handles of the instrument should

be held as in the former case, and the force gradually increased according to the resistance. Two or three trials will generally succeed in extricating the head from the brim of the pelvis, when it will rapidly advance without assistance: the forceps might be removed, but it is safer not to do so lest any impediment should delay its further progress, p. 184.

LXXVIII. Before *perforation* is performed, the bowels should be relieved, and the urine removed from the bladder, which should be carefully examined above the pubis, because sometimes the neck and fundus of the bladder are so compressed between the head and the pubis, that if a short catheter be used, the urine is only removed from the lower segment, while the principal portion remains above. When this is the case, the head should be pressed back as much as possible, and a long gum elastic catheter, of the size that will pass the urethra, introduced; great care should be taken not to use force in its passage, lest the instrument might perforate the canal, p. 190.

LXXIX. Two fingers of the right hand should be passed to the most depending part of the tumour that presents. The whole surface of the presentation should be carefully examined, in order to determine the degree of dilatation in the os uteri. If not fully dilated, observe the exact relation of the os uteri to the tumour on the head. If the os uteri be very thin, and closely embrace the tumour, its margin must be defined, lest the degree of dilatation escape your notice, p. 192.

LXXX. Let the fore-finger of the right hand remain applied to the centre of the presenting part, but rather to the pubic side, and with the left hand introduce the perforator, having the point (which is slightly curved) resting upon, and guarded by, the fore-finger. When both fingers meet, the right hand may be withdrawn from the vagina, and the perforator forced through the tumour and bone at the part where the fore-finger had been applied. The first two fingers of the left hand should then rest on the stops of the instrument to prevent the perforator slipping from the opening when the handles are raised, and to secure the vagina from injury. When the bone is sufficiently broken in one direction the handle may be changed to the opposite, and a crucial opening made. The perforator should be passed into the opening, and the brain completely broken up, p. 192.

LXXXI. When the perforator is withdrawn, the fore-finger

of the right hand should still remain within the opening, and the crotchet introduced, having the handle directed backwards towards the coccyx, when, with a little careful management, it may be passed through, and the remainder of the brain removed. The handle of the crotchet should then be held firmly in the right hand, while two or three fingers of the left are applied to the bone externally. The force should be so applied, that the bone may be held tightly between the flat part of the point and the finger, without directing it much on the point itself, pp. 192, 193.

LXXXII. When the craniotomy forceps is used, the blade, which is rough or dentated, is introduced within the cranium, while the opposite blade is passed outside. When they are closed, the teeth perforate the bone, and are received by corresponding openings in the opposite blade. Extraction may then be made without difficulty, provided the bone does not give way. This is less likely to take place when the blade is not made with teeth, p. 194.

LXXXIII. The induction of premature labour may be effected by introducing a sponge tent within the os uteri, so as to dilate it. If this fail, puncture the membranes with a stilette. Uterine action generally commences within forty-eight hours, p. 207.

LXXXIV. The induction of premature labour is not applicable to first pregnancy, unless there be very clear proof of great distortion.

The most certain evidence is the result of previous labours, where perforation had been required, or when, with every successive labour, the contraction of the pelvis may have so increased as to render the last labour more difficult than the preceding one: so that, ultimately, perforation might be necessary, unless in this way obviated, p. 207.

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